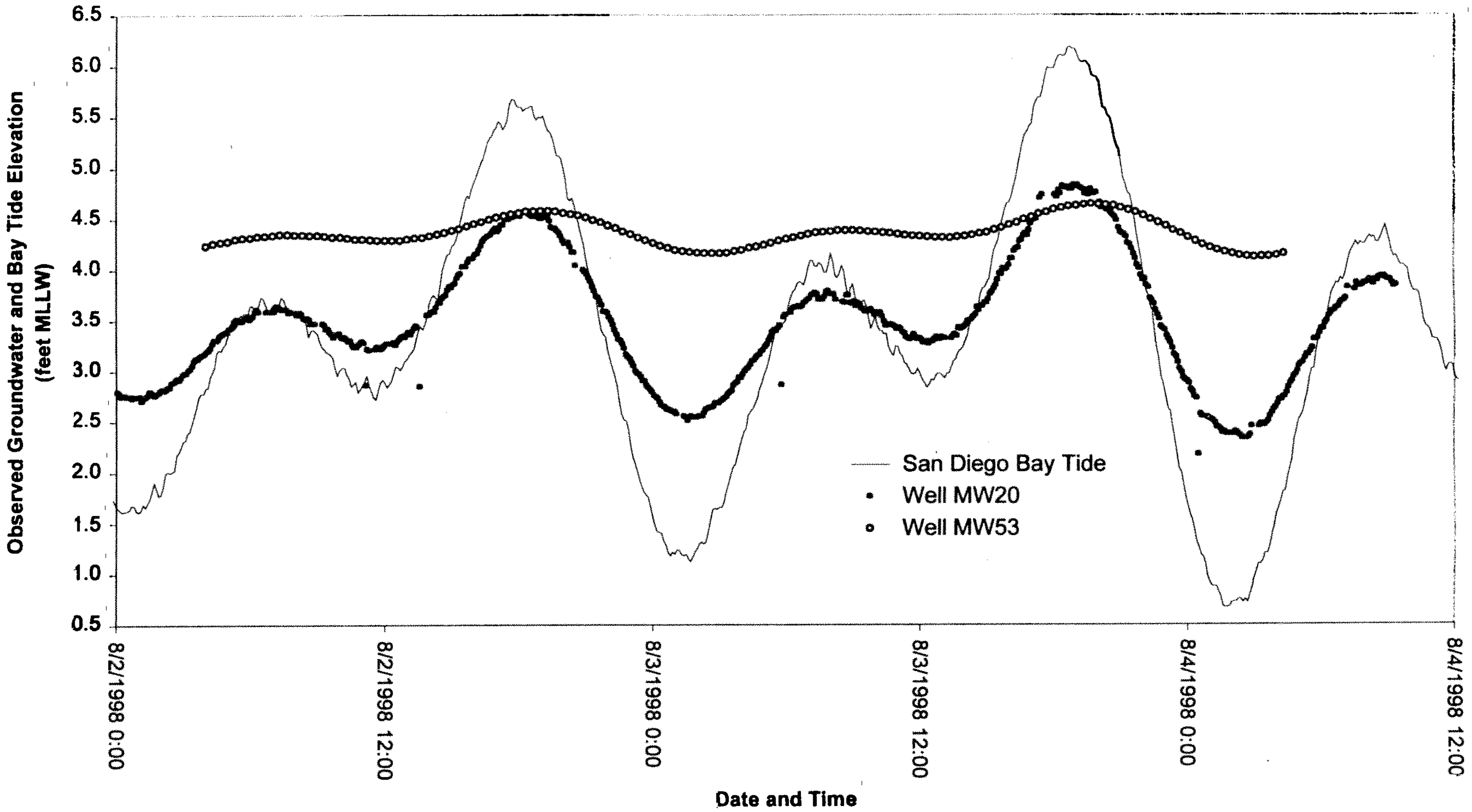
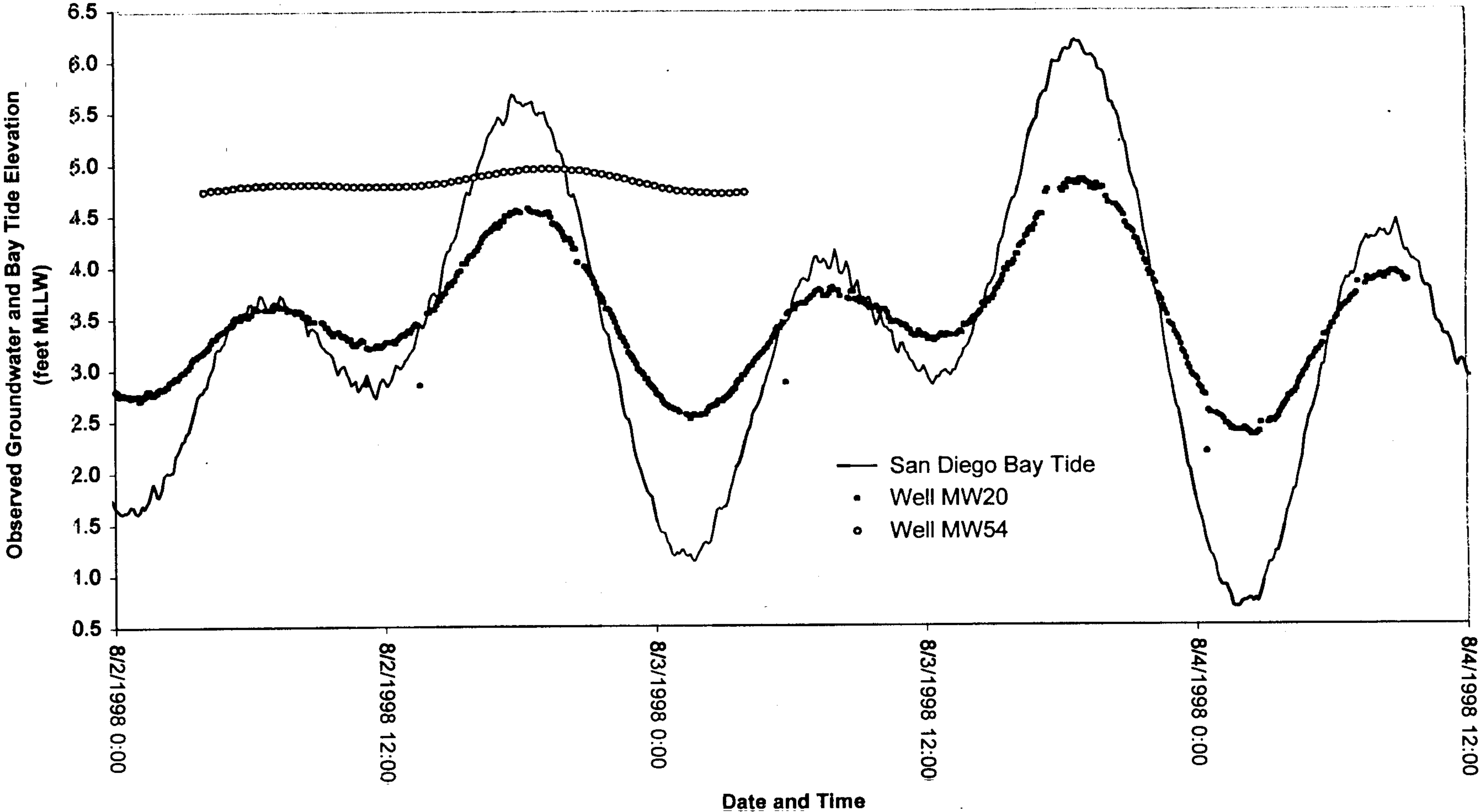


NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-9
OBSERVED WATER LEVEL COMPARISON AMONG BAY TIDE, MW20 AND MW53

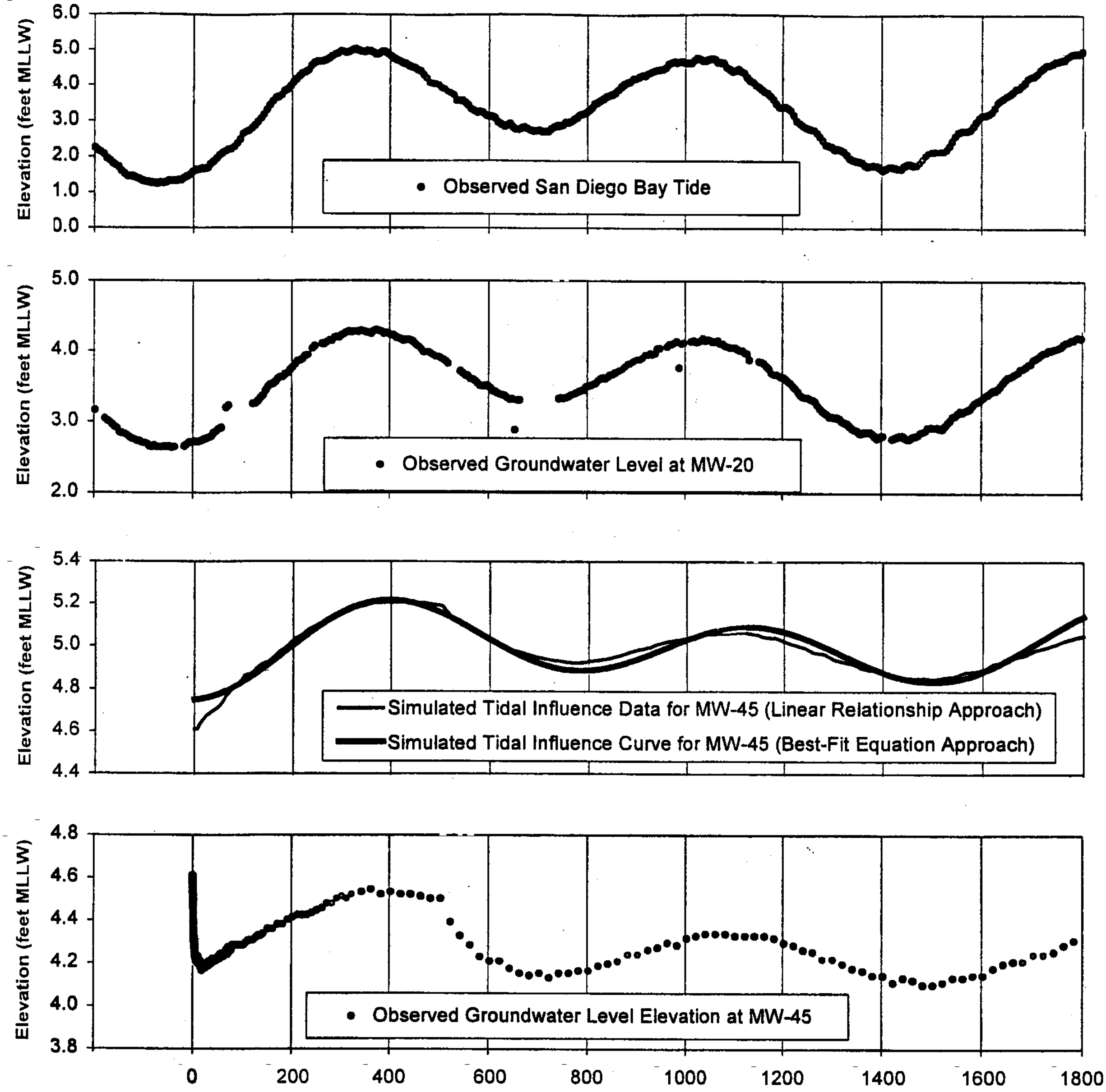
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-10
OBSERVED WATER LEVEL COMPARISON
AMONG
BAY TIDE, MW20 AND MW54

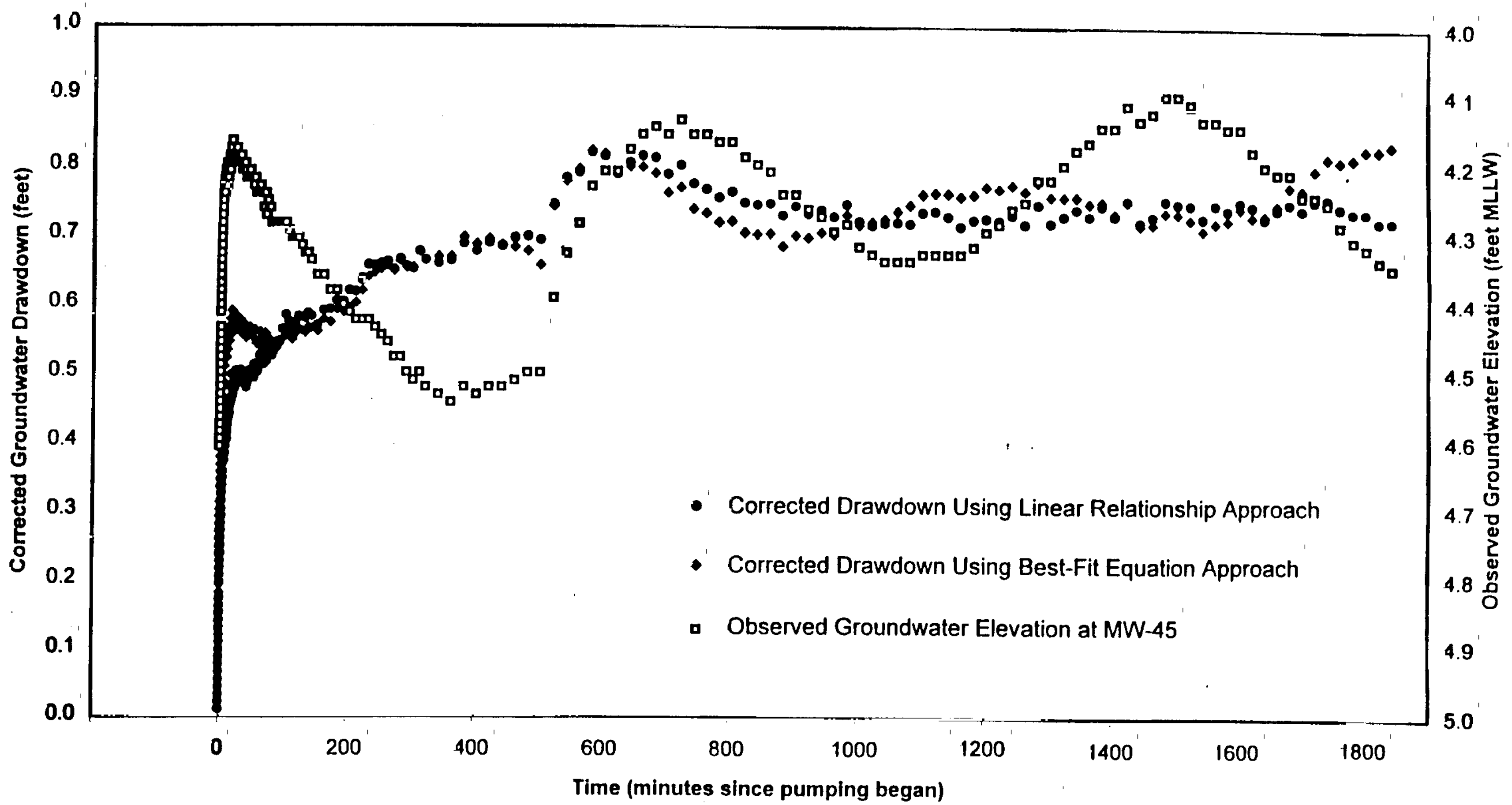
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-11
OBSERVED AND SIMULATED WATER LEVEL COMPARISON AMONG BAY TIDE, MW20, MW45 DURING THE PUMPING TEST
(Upper Aquifer Zone Constant Rate Pumping Test)

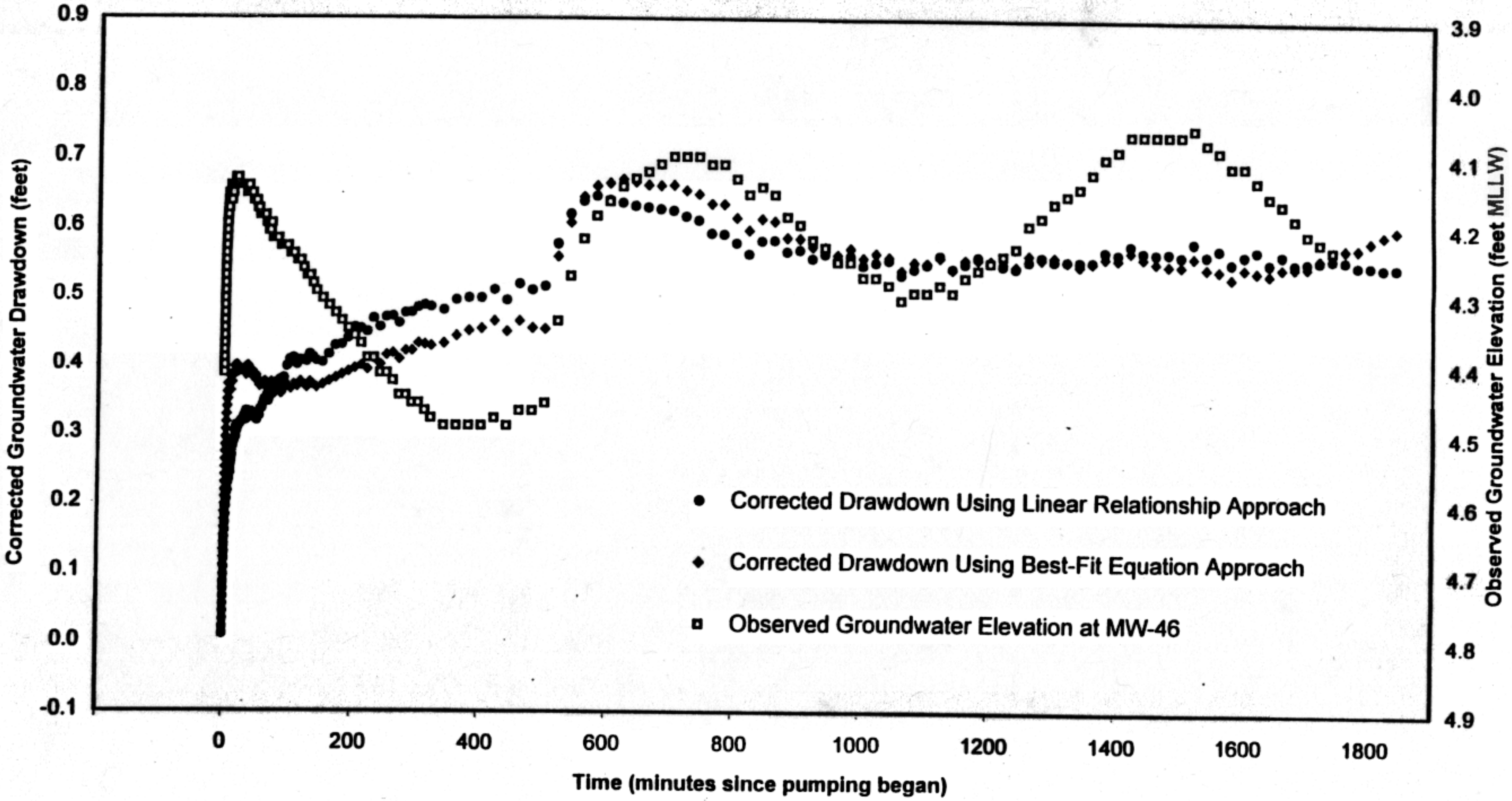
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-12
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW45
(Upper Aquifer Zone Constant Rate Pumping Test)

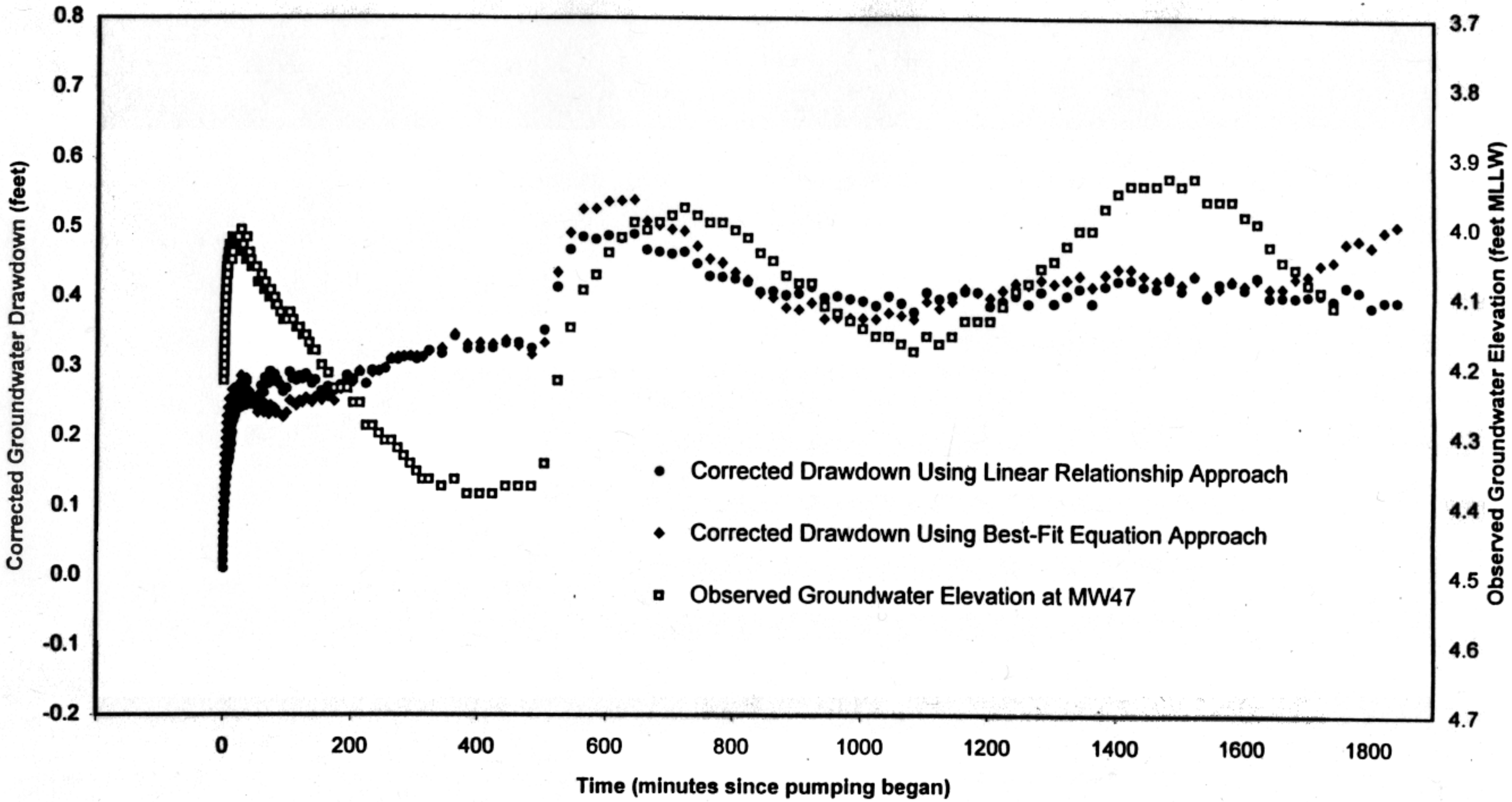
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-13
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW46
(Upper Aquifer Zone Constant Rate Pumping Test)

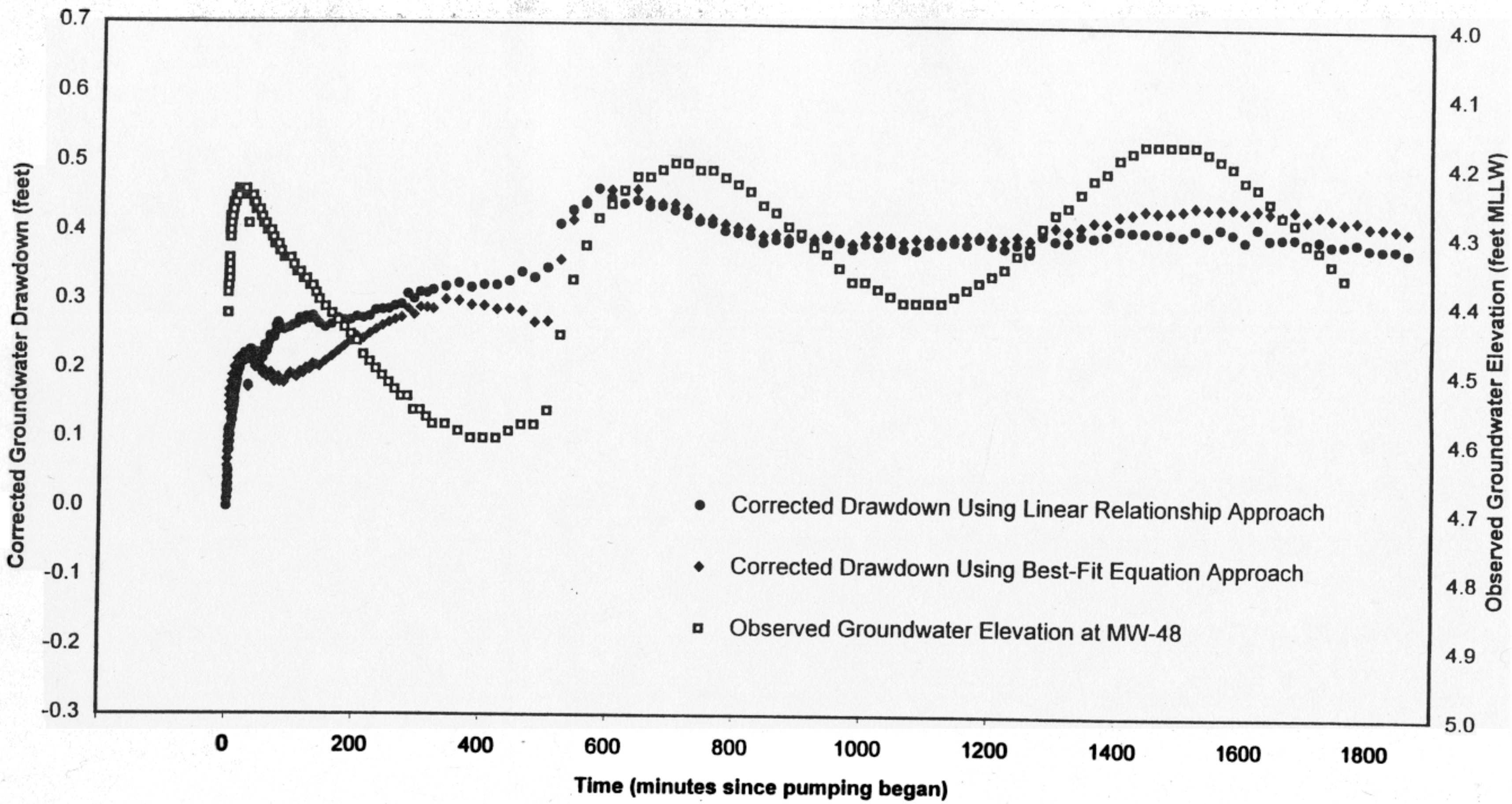
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-14
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW47
(Upper Aquifer Zone Constant Rate Pumping Test)

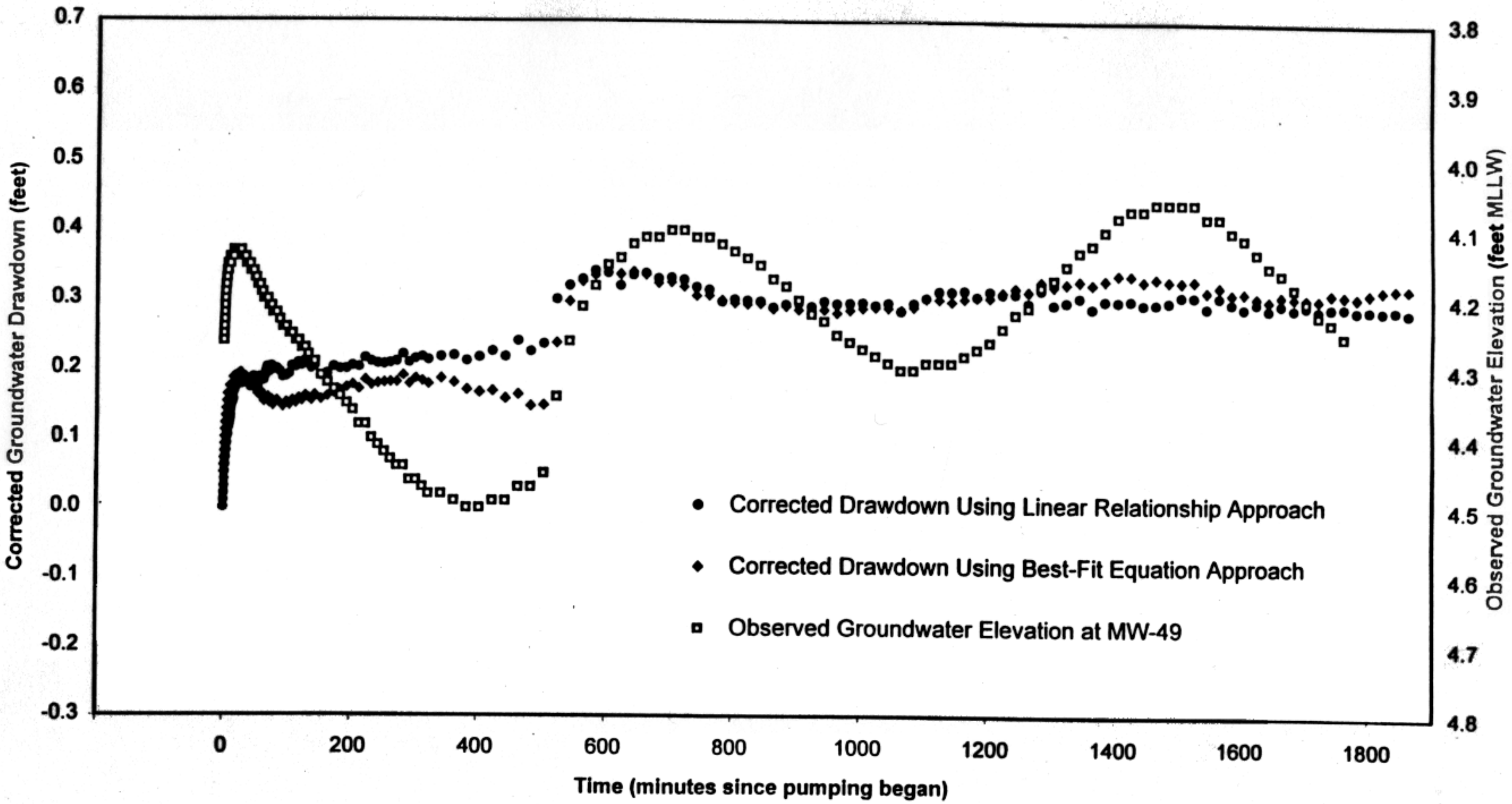
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-15
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW48
(Upper Aquifer Zone Constant Rate Pumping Test)

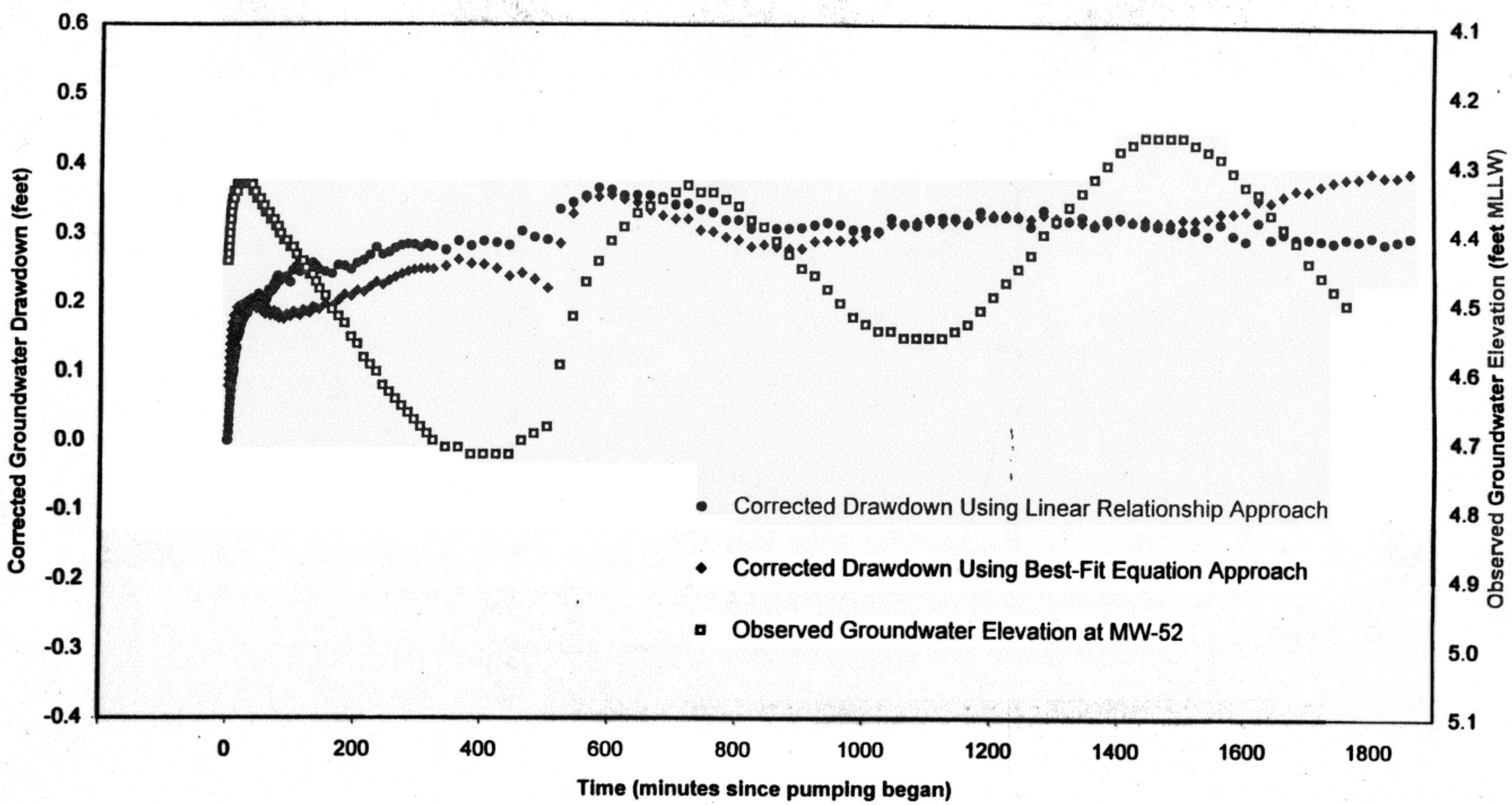
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-16
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW49
(Upper Aquifer Zone Constant Rate Pumping Test)

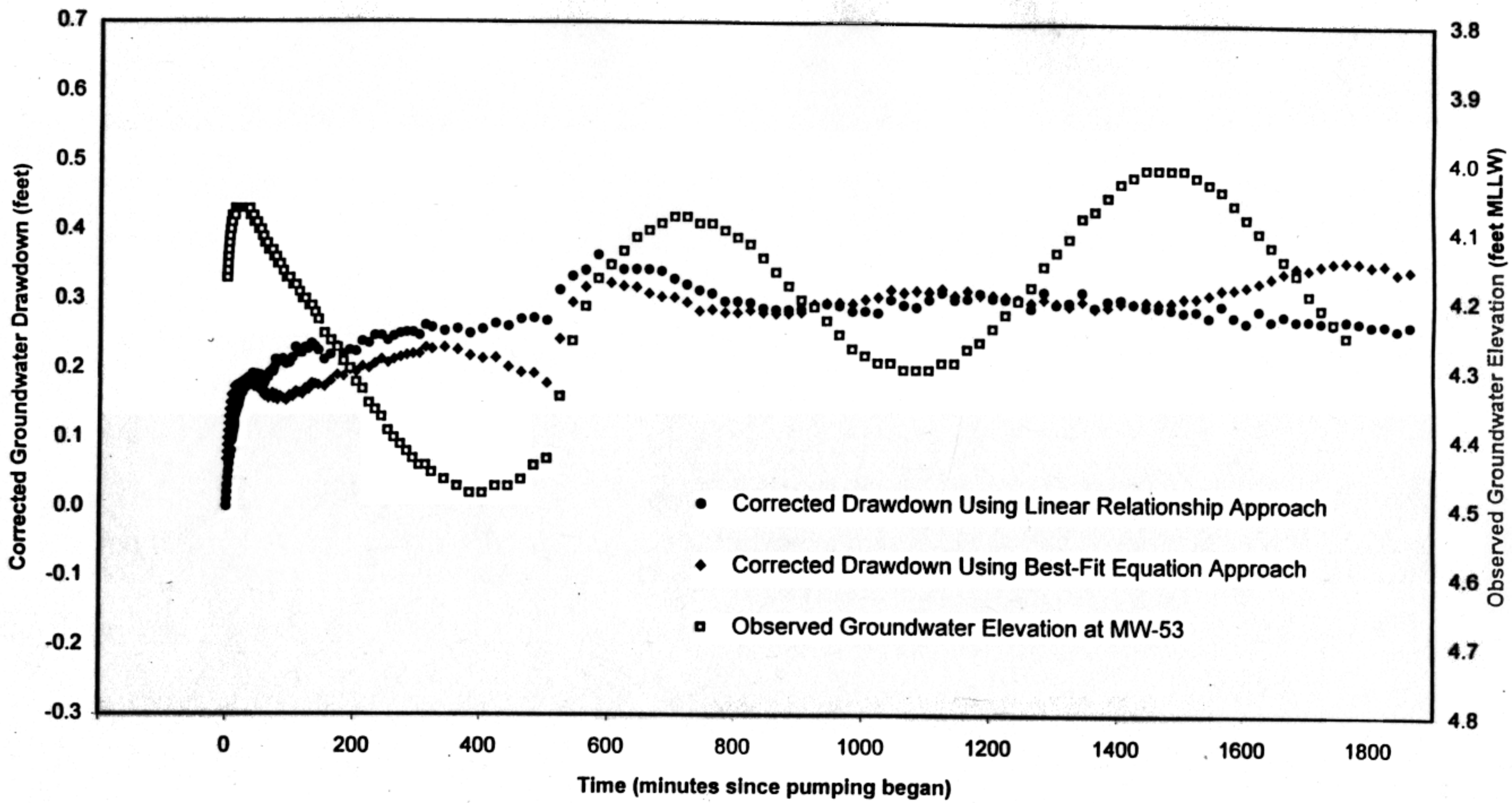
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-17
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW52
(Upper Aquifer Zone Constant Rate Pumping Test)

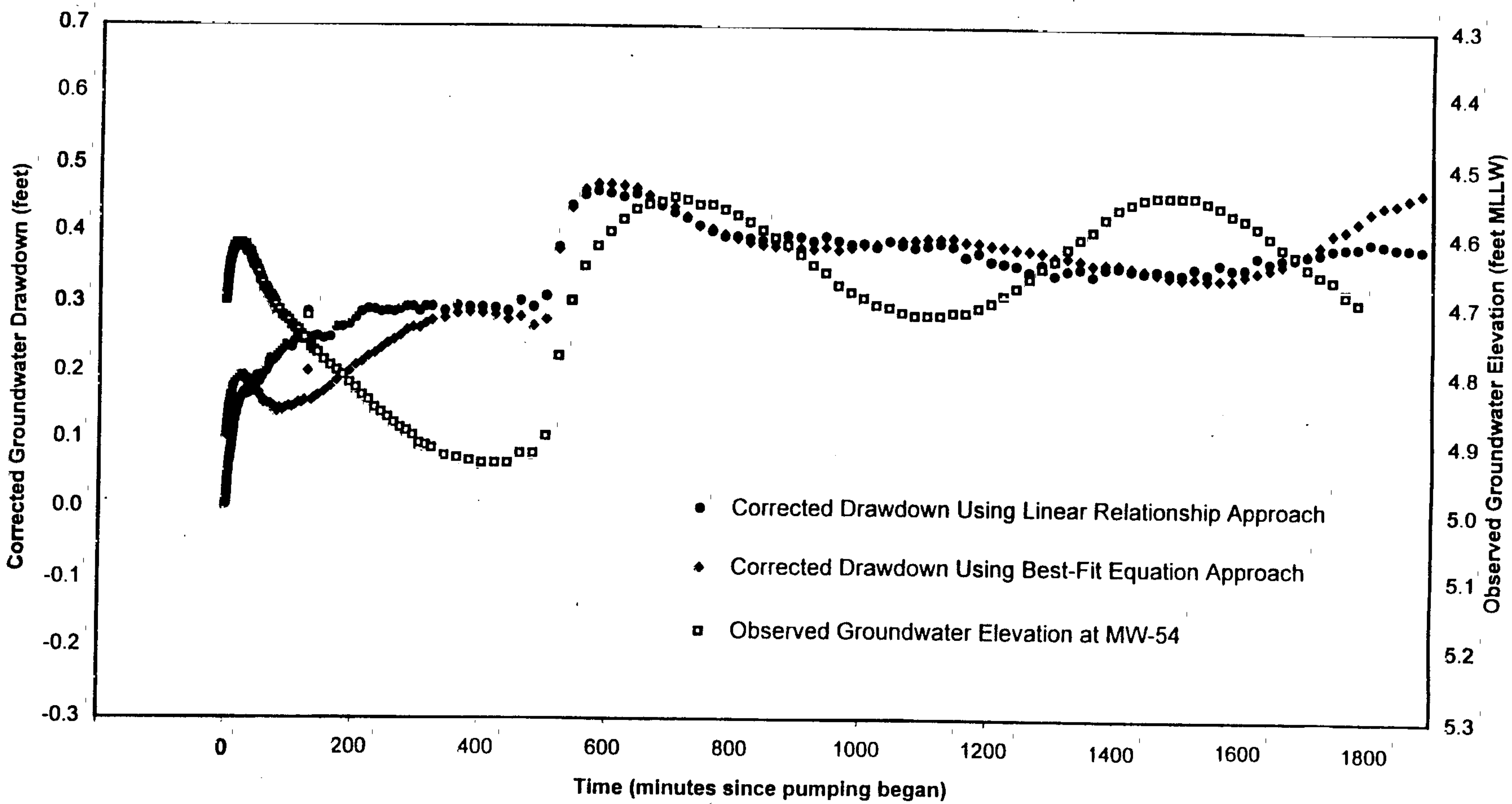
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-18
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW53
(Upper Aquifer Zone Constant Rate Pumping Test)

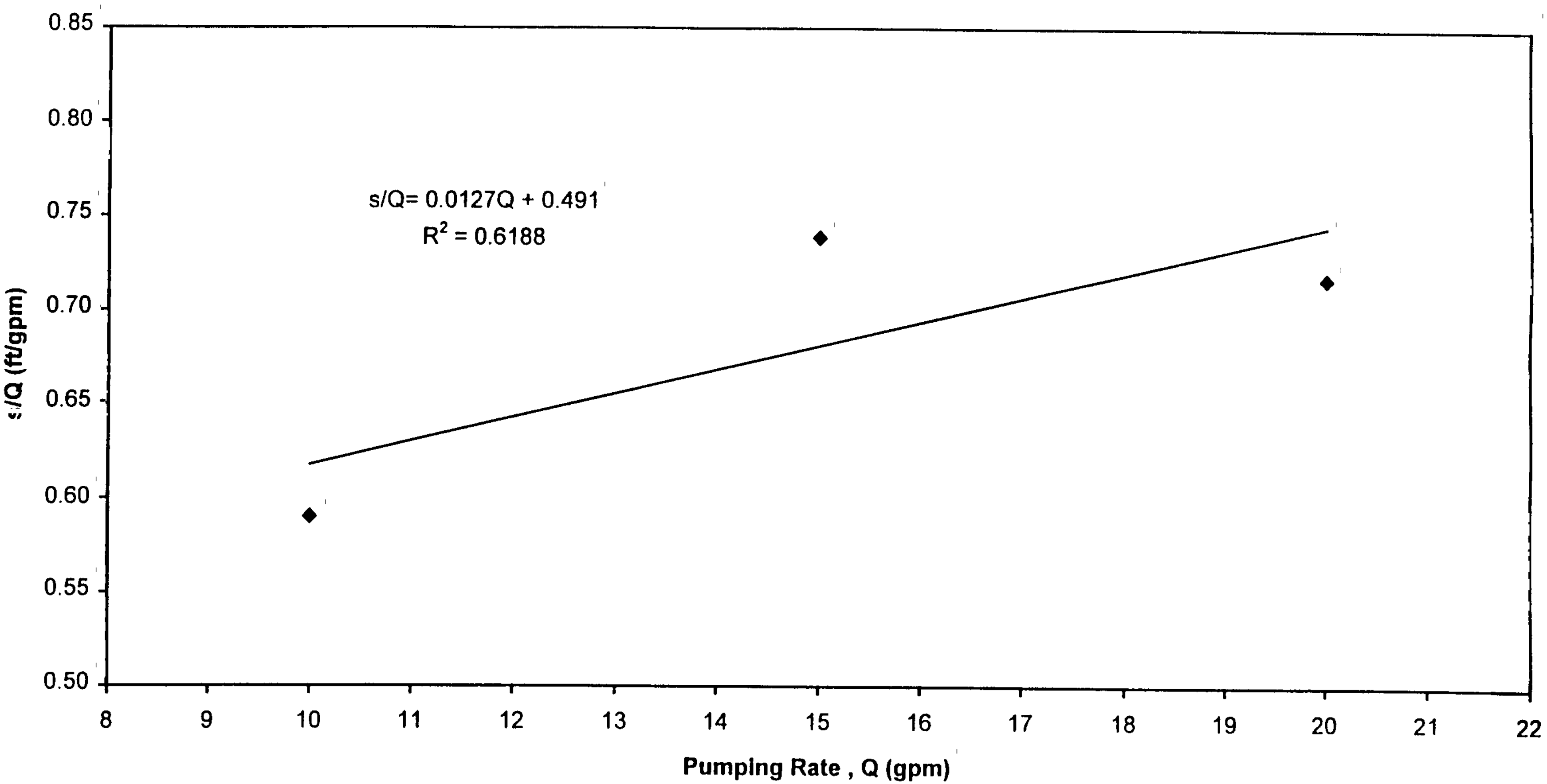
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-19
OBSERVED AND CORRECTED GROUNDWATER DRAWDOWN AT WELL MW54
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.

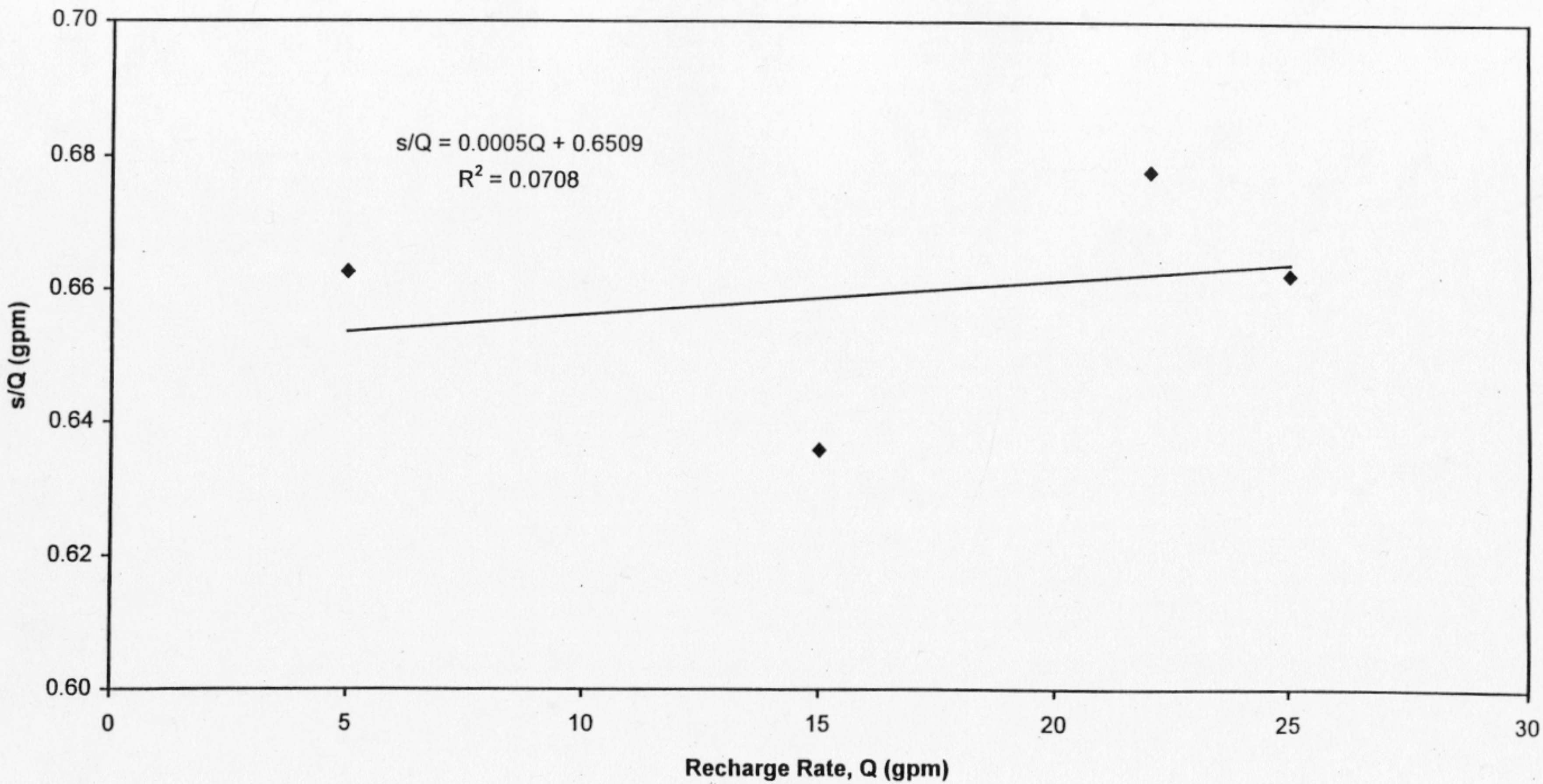


NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-20
s/Q vs.Q PLOTS

(Upper Aquifer Zone Step-drawdown Test)

Tetra Tech EM Inc.

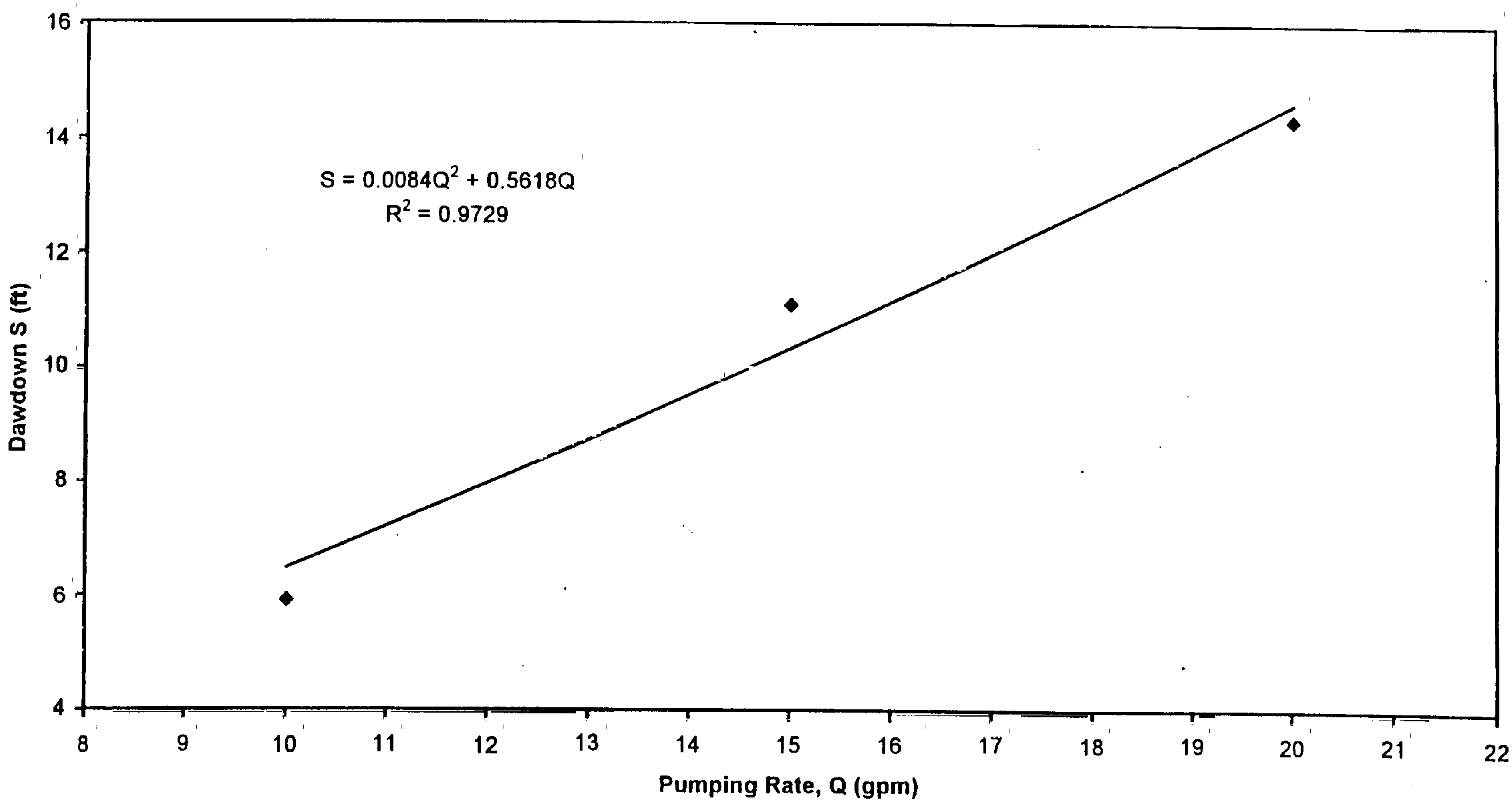


NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-21
s/Q vs.Q PLOTS

(Upper Aquifer Zone Injection Test)

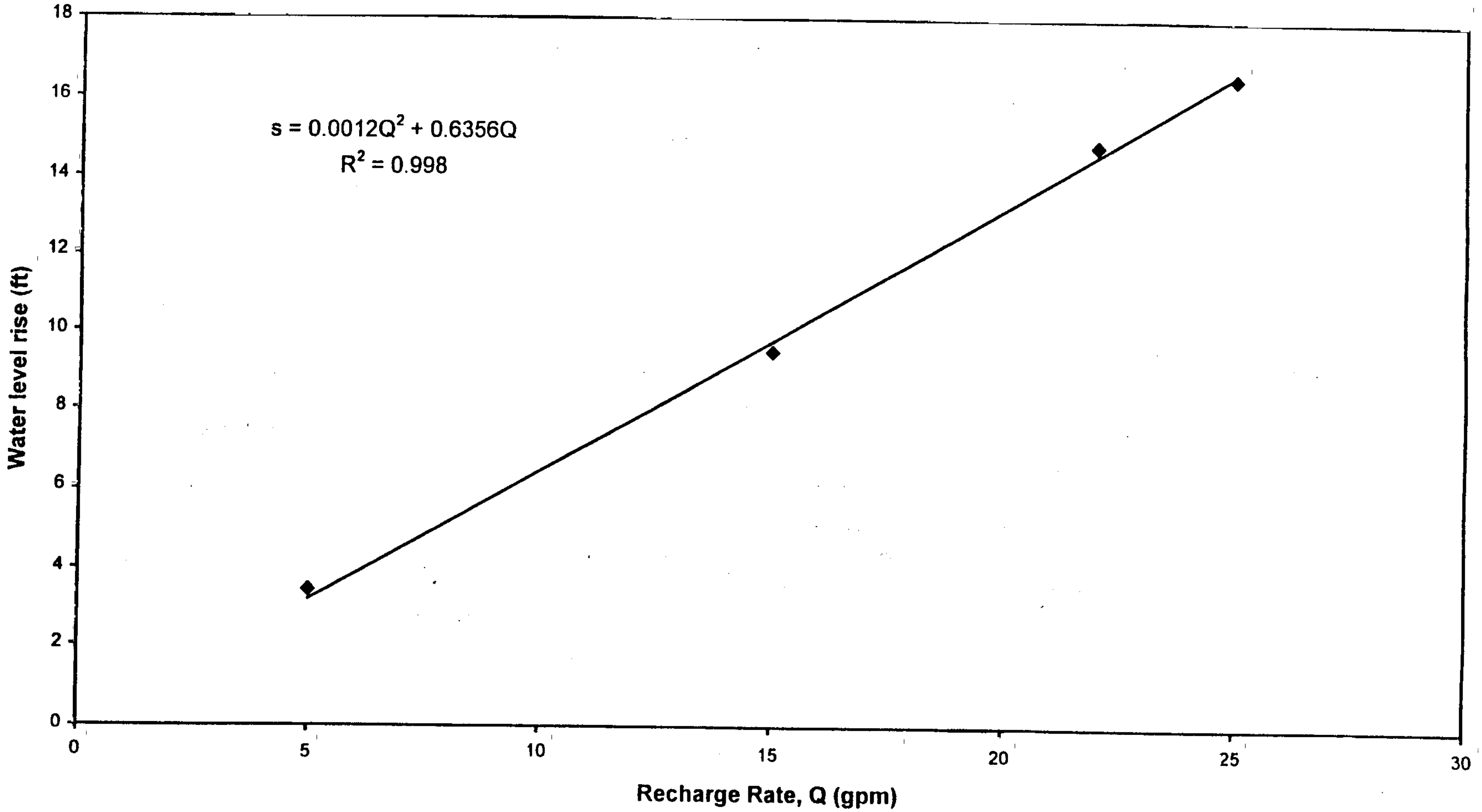
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-22
MAXIMUM DRAWDOWN vs. PUMPING RATE AND THE BEST FIT EQUATION
(Upper Aquifer Zone Step-drawdown Test)

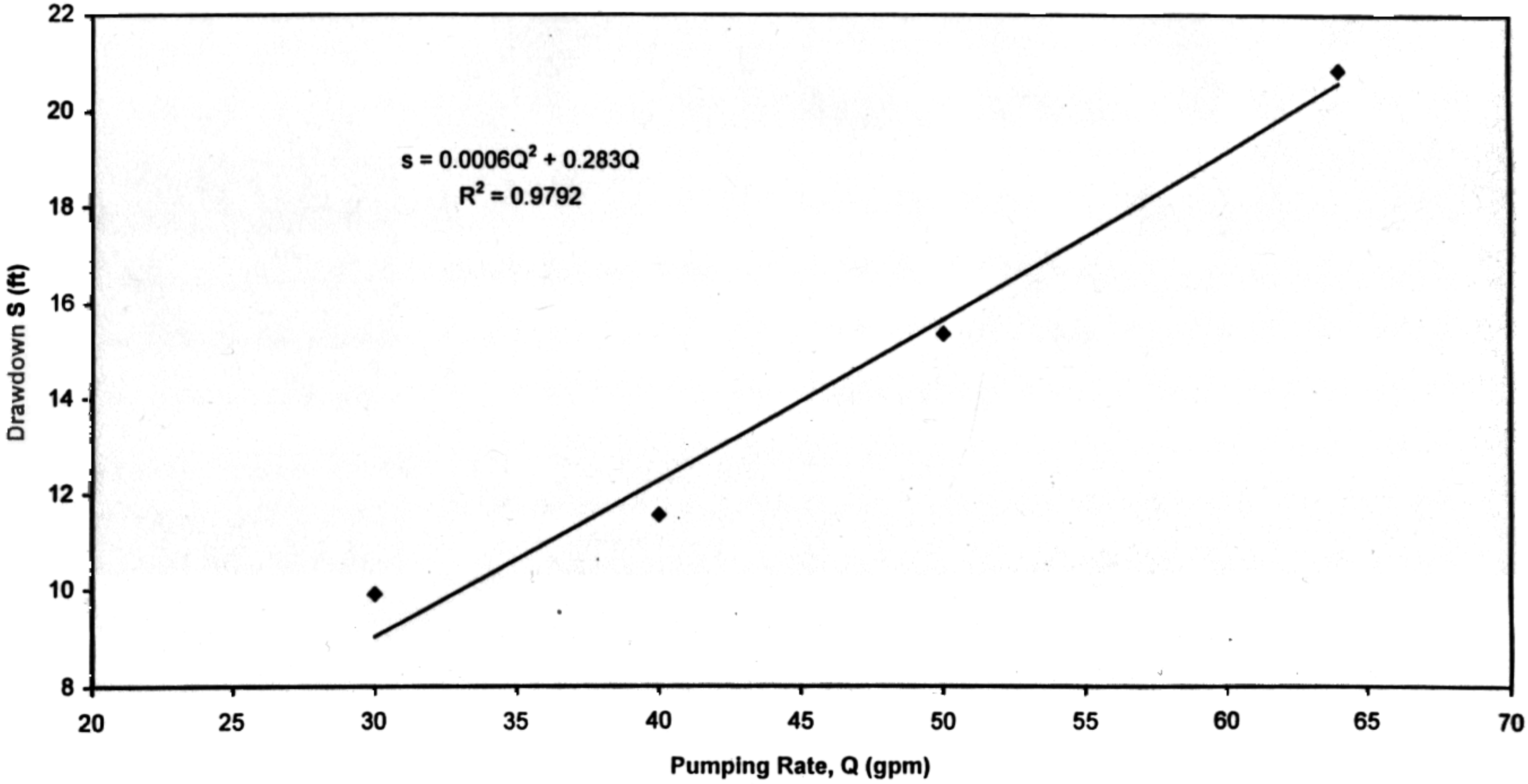
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-23
MAXIMUM WATER LEVEL RISE vs. RECHARGE RATE AND THE BEST FIT EQUATION
(Upper Aquifer Zone InjectionTest)

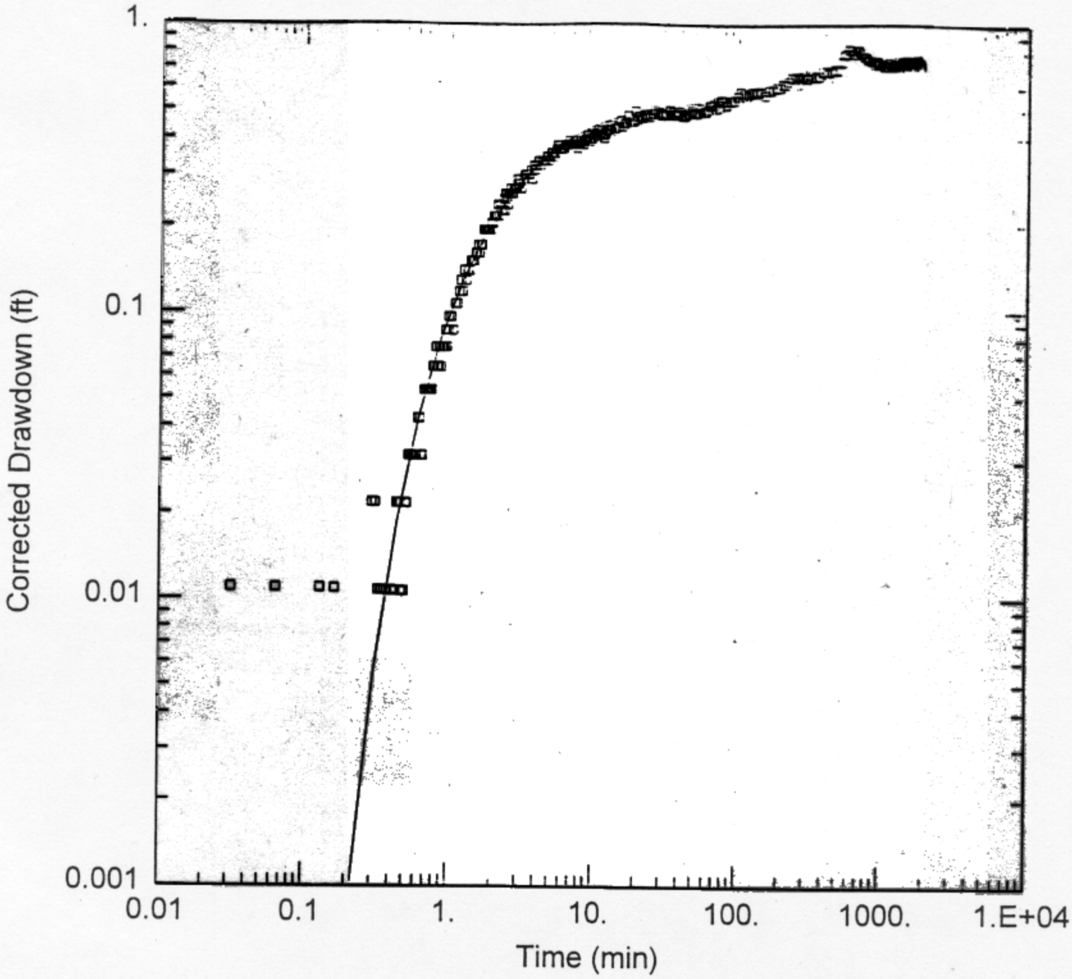
Tetra Tech EM Inc.



NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-24
MAXIMUM DRAWDOWN vs. PUMPING RATE AND THE BEST FIT EQUATION
(Lower Aquifer Zone Step-drawdown Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW45

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW45-88.AQT
Date: 02/12/99 Time: 17:47:28

SOLUTION

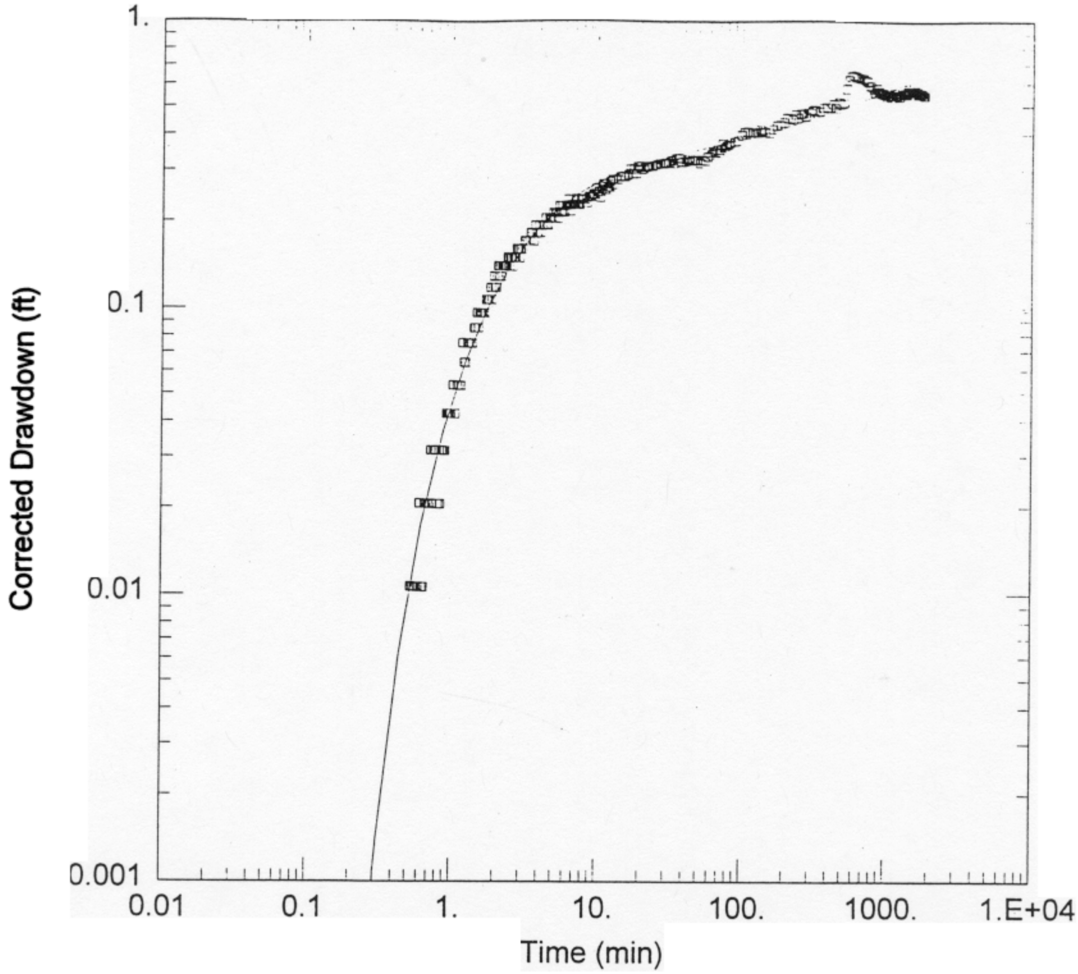
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2450. ft^2/day
S = 0.008428
Sy = 0.1201
ß = 0.03

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-25
MW45 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW46

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW46-88.AQT
Date: 02/12/99 Time: 17:25:35

SOLUTION

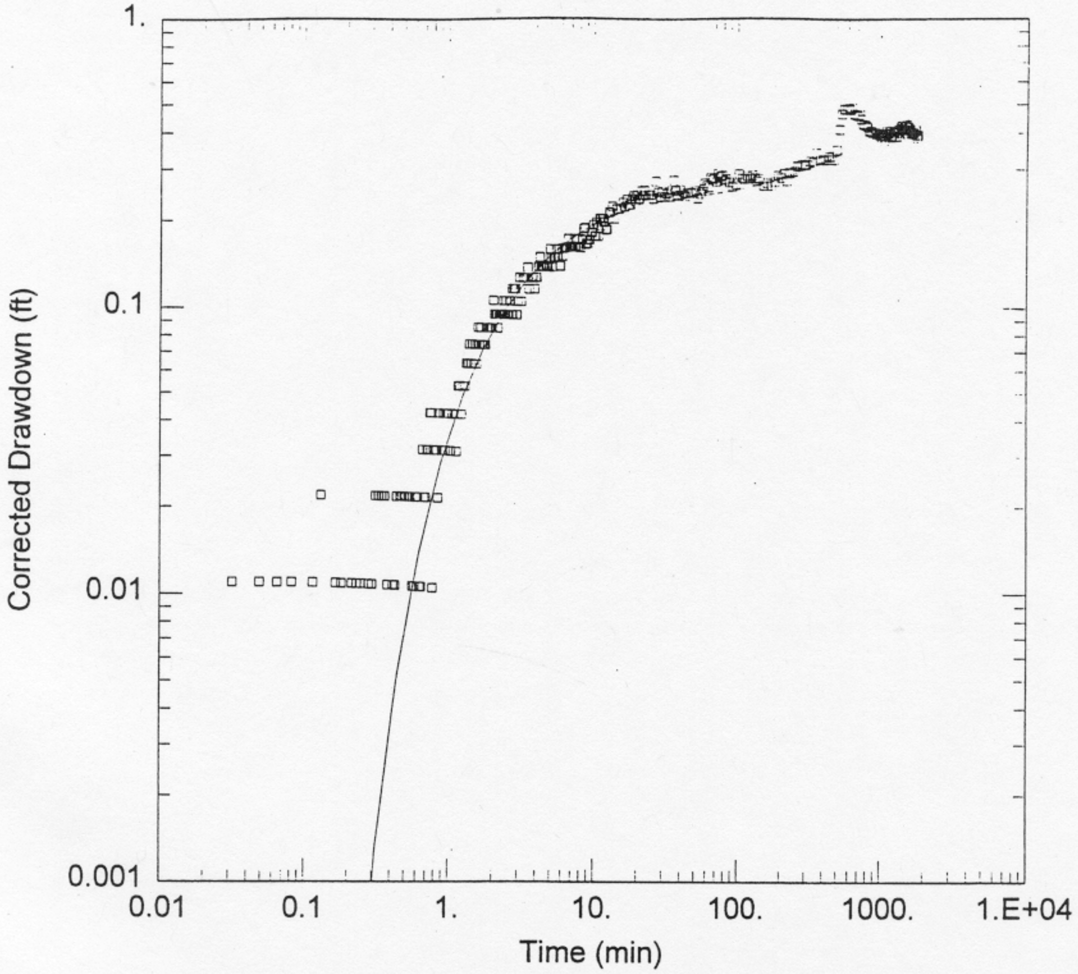
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2722.3 ft^2/day
S = 0.007299
Sy = 0.05222
ß = 0.03

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-26
MW46 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW-47

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW47-88.AQT
Date: 02/12/99 Time: 17:25:47

SOLUTION

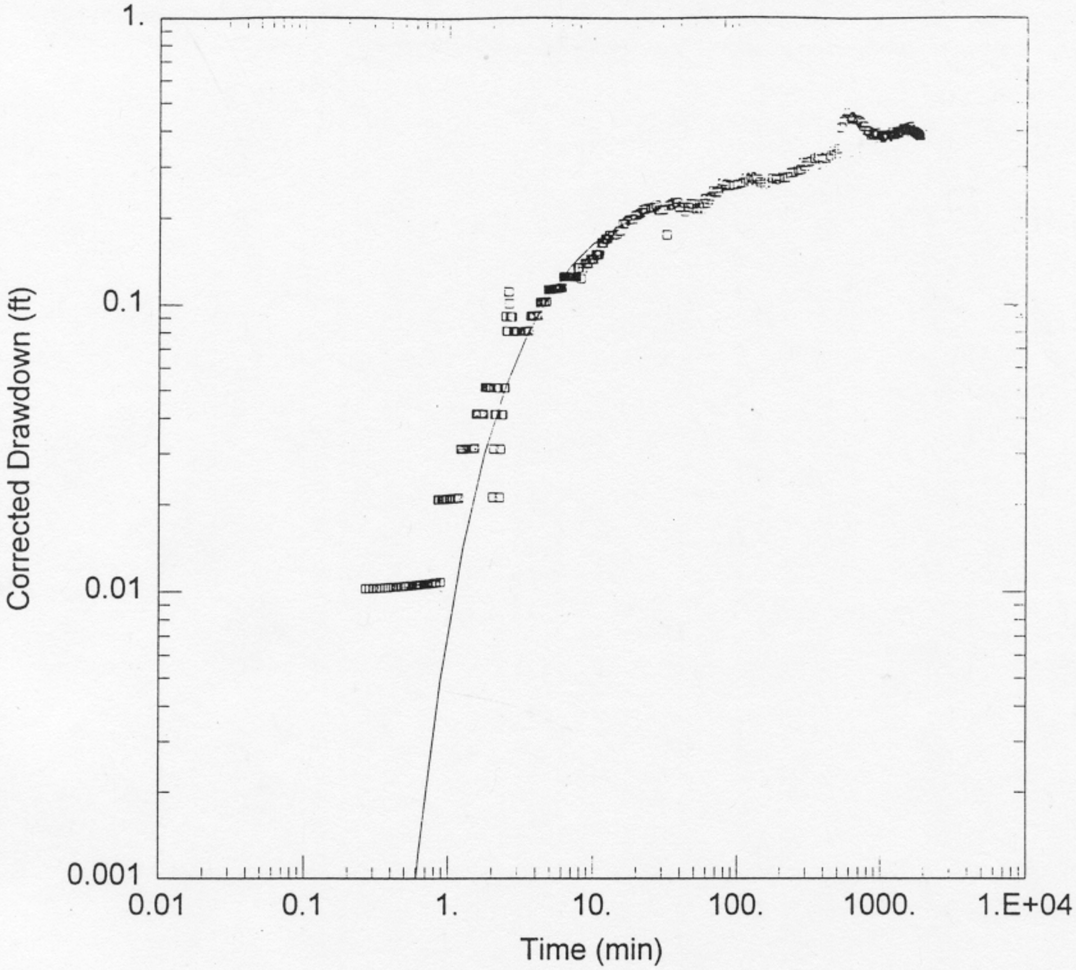
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2441.4 ft^2/day
S = 0.001919
Sy = 0.05972
ß = 0.03

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-27
MW47 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW48

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW48-88.AQT
Date: 02/12/99 Time: 17:25:57

SOLUTION

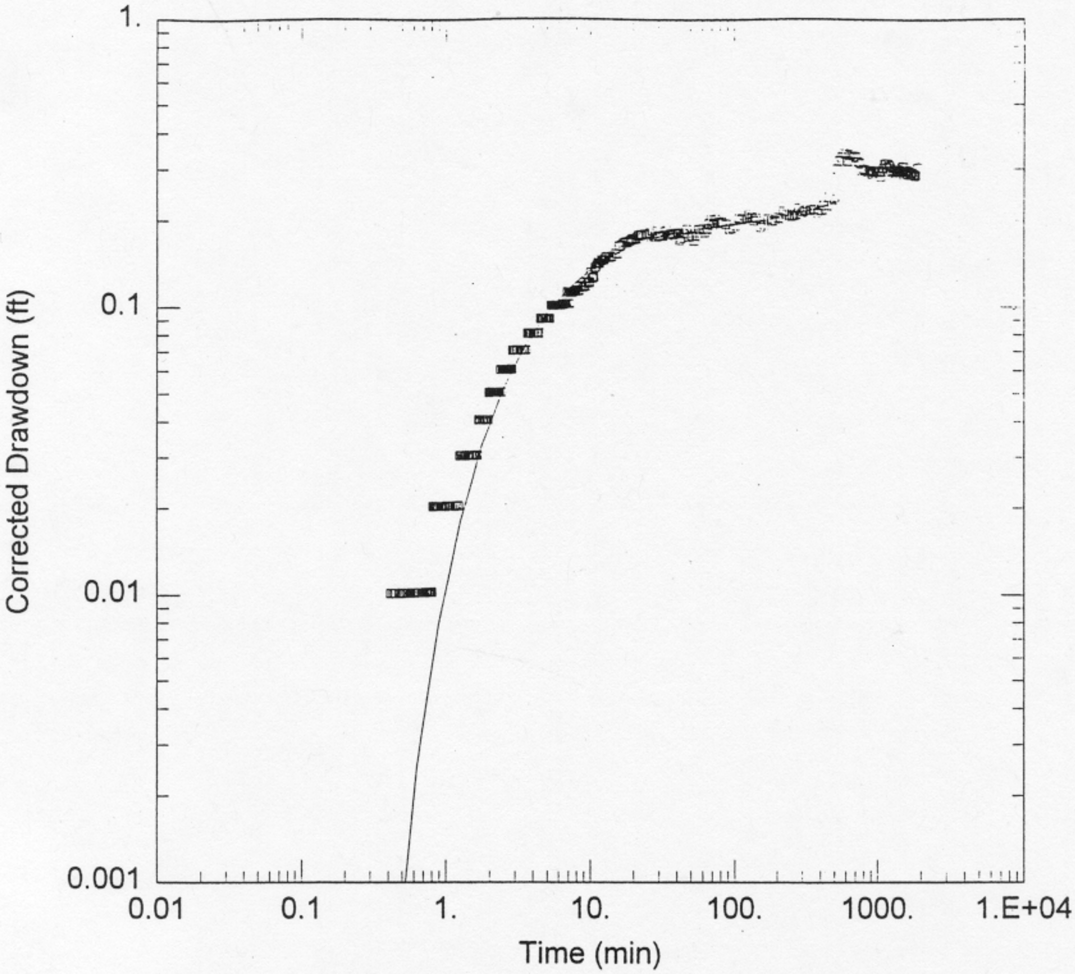
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2553. ft^2/day
S = 0.004492
Sy = 0.08931
ß = 0.09

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-28
MW48 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW49

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW49-88.AQT
Date: 02/12/99 Time: 17:26:08

SOLUTION

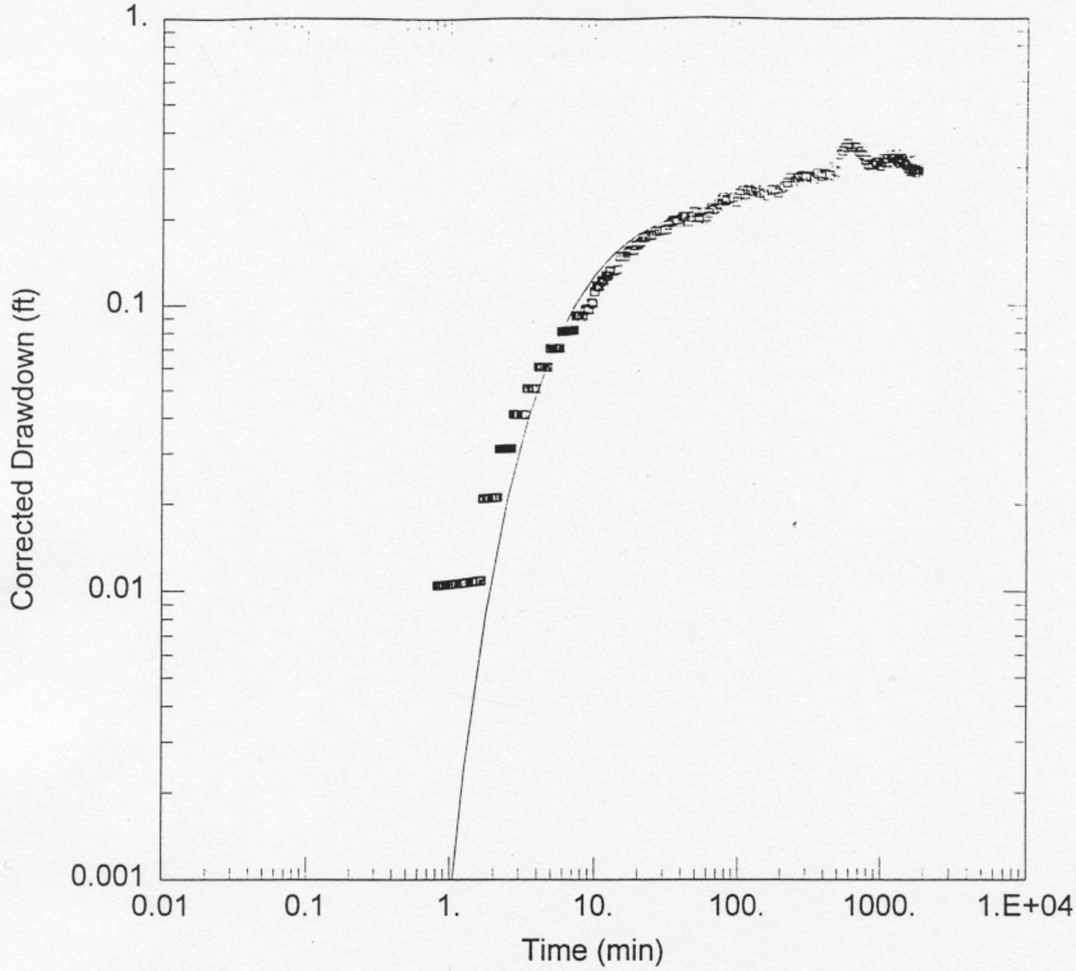
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2774. ft^2/day
S = 0.002236
Sy = 0.1075
ß = 0.08

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-29
MW49 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW52

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW52-88.AQT
Date: 02/12/99 Time: 17:26:23

SOLUTION

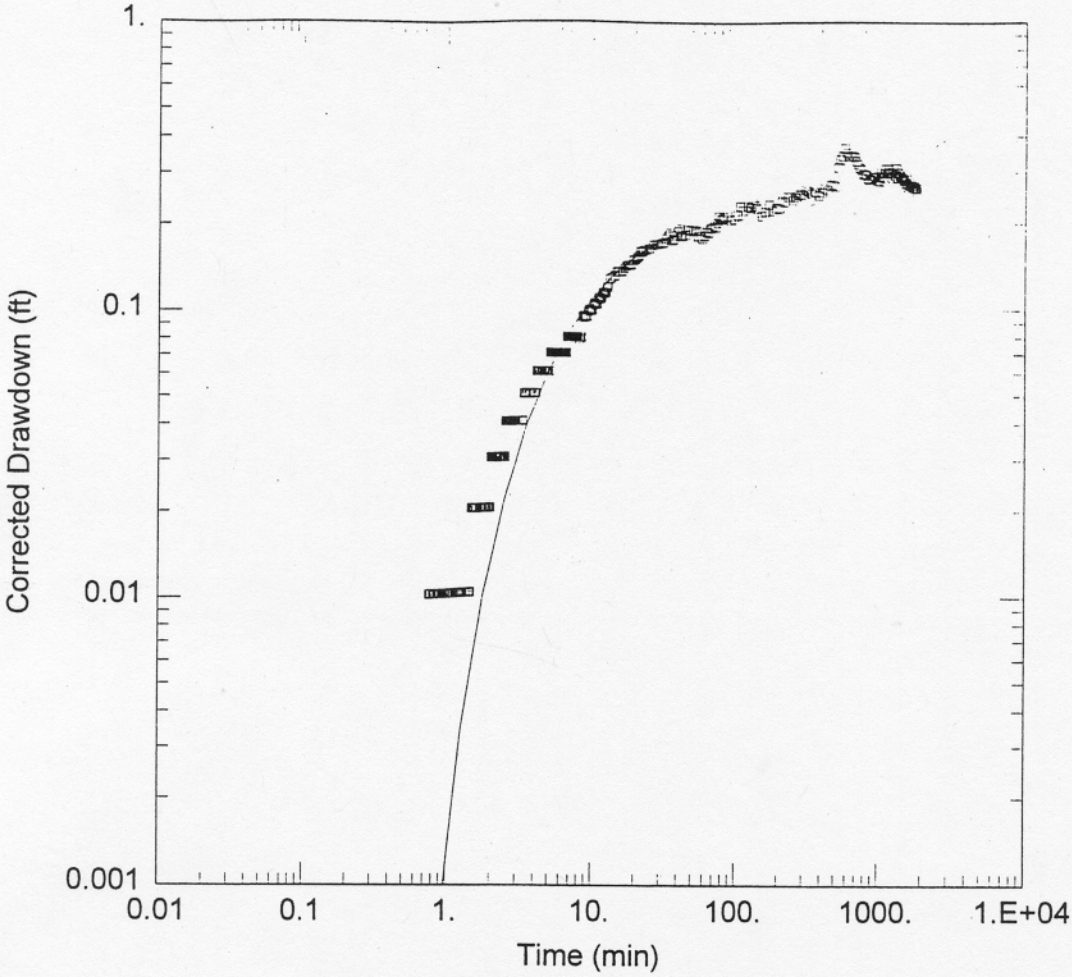
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2550. ft^2/day
S = 0.003845
Sy = 0.1
ß = 0.09

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-30
MW52 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW53

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW53-88.AQT
Date: 02/12/99 Time: 17:26:32

SOLUTION

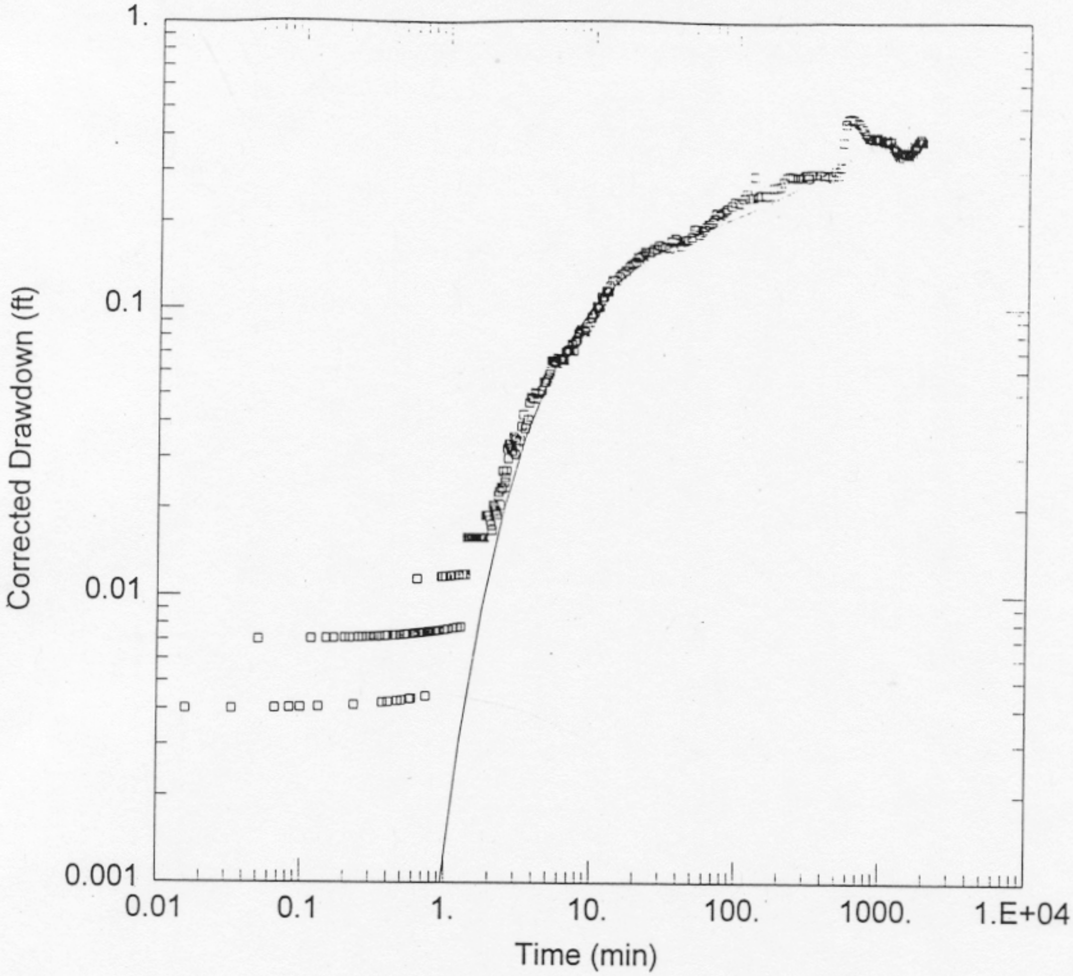
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2198.7 ft^2/day
S = 0.001353
Sy = 0.04903
ß = 0.1

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-31
MW53 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.



NAS NI SITE 9 PUMPING TEST DATA - MW54

Data Set: S:\NOVOCS\WORKIN~2\CONSTA~2\MW54-88.AQT
Date: 02/12/99 Time: 17:26:44

SOLUTION

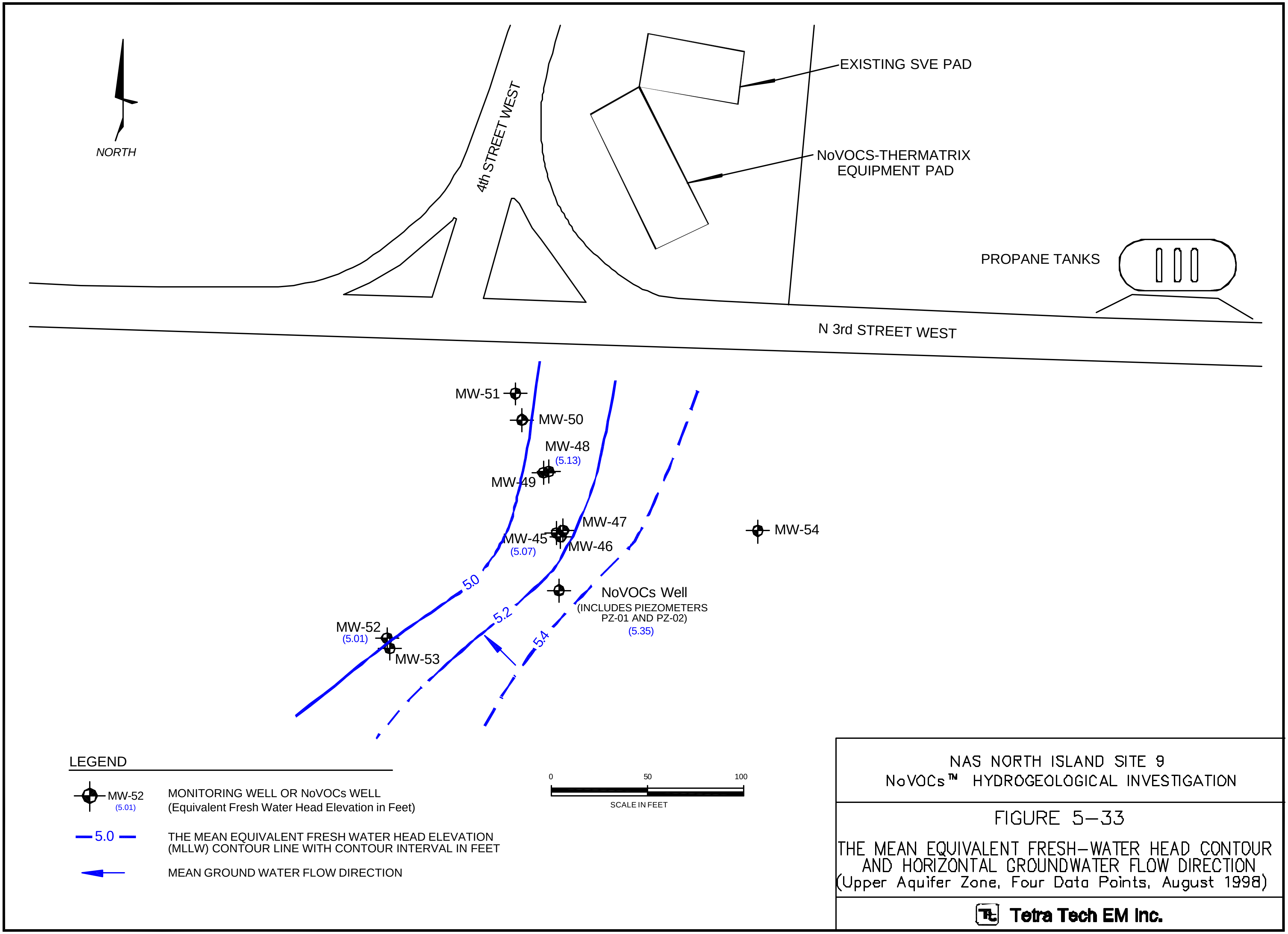
Aquifer Model: Unconfined
Solution Method: Neuman

T = 2515. ft^2/day
S = 0.002144
Sy = 0.015
ß = 0.12

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-32
MW54 DRAWDOWN DATA PLOT
AND TYPE CURVE MATCH
(Upper Aquifer Zone Constant Rate Pumping Test)

Tetra Tech EM Inc.

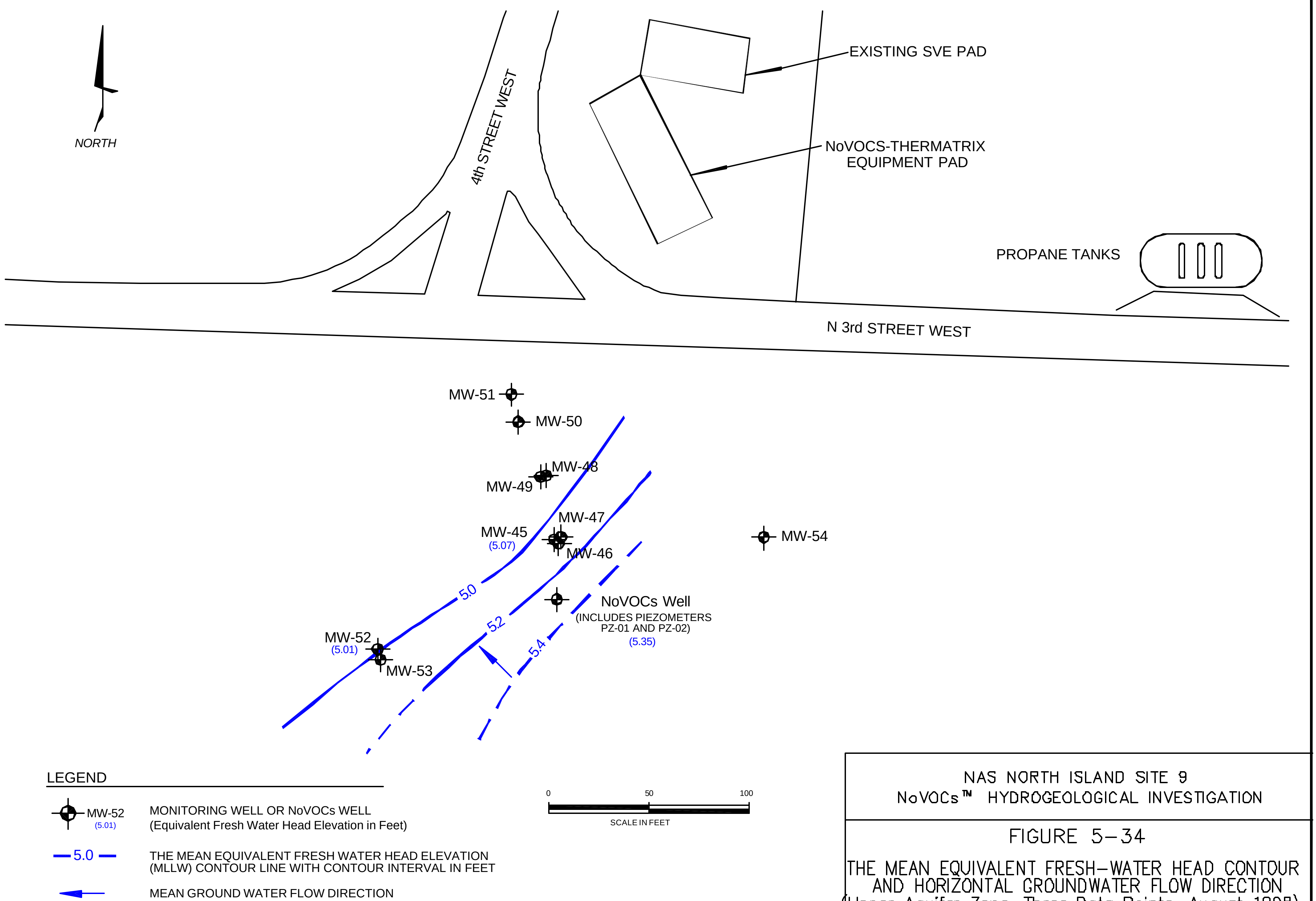


NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5–33

THE MEAN EQUIVALENT FRESH–WATER HEAD CONTOUR AND HORIZONTAL GROUNDWATER FLOW DIRECTION (Upper Aquifer Zone, Four Data Points, August 1998)

Tetra Tech EM Inc.

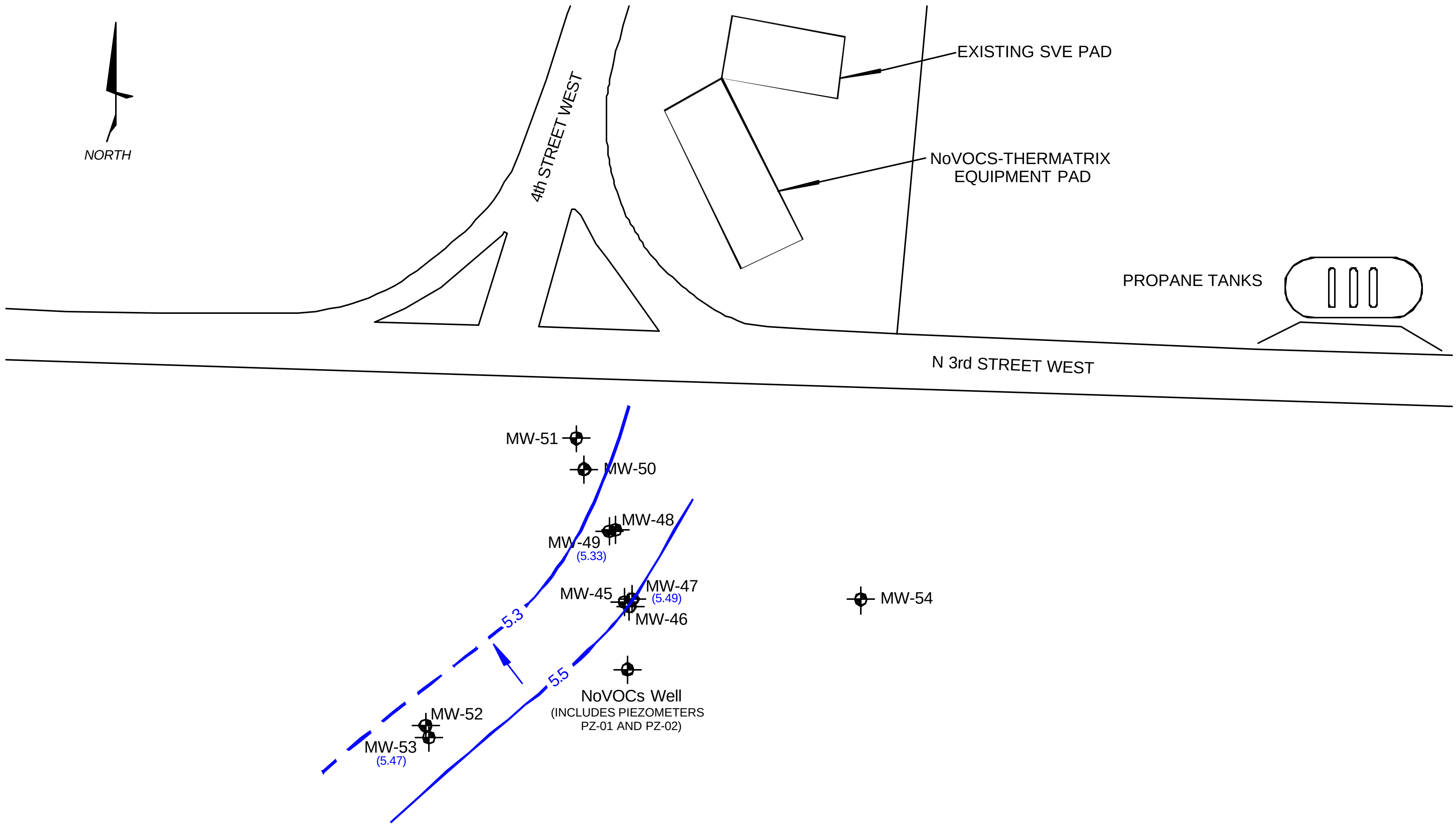


NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5-34

THE MEAN EQUIVALENT FRESH-WATER HEAD CONTOUR
AND HORIZONTAL GROUNDWATER FLOW DIRECTION
(Upper Aquifer Zone, Three Data Points, August 1998)

Tetra Tech EM Inc.



LEGEND

MW-53 (5.47) MONITORING WELL OR NoVOCs WELL (Equivalent Fresh Water Head Elevation in Feet)

5.3 THE MEAN EQUIVALENT FRESH WATER HEAD ELEVATION (MLLW) CONTOUR LINE WITH CONTOUR INTERVAL IN FEET

MEAN GROUND WATER FLOW DIRECTION

0 50 100

SCALE IN FEET

NAS NORTH ISLAND SITE 9
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION

FIGURE 5–35

THE MEAN EQUIVALENT FRESH-WATER HEAD CONTOUR AND HORIZONTAL GROUNDWATER FLOW DIRECTION (Lower Aquifer Zone, Three Data Points, August 1998)

Tetra Tech EM Inc.

TABLE 5-1

TIDAL INFLUENCE PARAMETER VALUES
TIDAL INFLUENCE STUDY OF APRIL 10 THROUGH 20, 1998
NoVOCs^{TM}HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Measurement Point	Range (feet)			Tidal Efficiency			Time Lag (minutes)		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean
San Diego Bay	1.72	8.11	5.27	1.00	1.00	1.00	0	0	0
MW45	0.11	0.58	0.36	0.05	0.08	0.07	52	94	70
MW46	0.09	0.56	0.36	0.05	0.08	0.07	52	94	71
MW47	0.09	0.58	0.36	0.05	0.08	0.07	46	94	72
MW48	0.10	0.58	0.36	0.05	0.08	0.07	52	90	72
MW49	0.11	0.58	0.37	0.05	0.08	0.07	56	93	71
MW50	0.10	0.60	0.37	0.05	0.08	0.07	52	96	72
MW52	0.12	0.72	0.46	0.07	0.10	0.09	46	85	69
MW53	0.12	0.73	0.45	0.06	0.10	0.09	54	93	70

Note:

Values presented are based on calculations for each of the 39 tidal periods during the 10-day study. A tidal period extends from consecutive high to low or low to high tidally influenced groundwater levels.

TABLE 5-2

**PARAMETERS USED IN TIDAL CORRECTION
FOR THE CONSTANT DISCHARGE PUMPING TEST
NoVOCs™HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND**

Well ID	**Tidal Efficiency**			**Time Lag (minutes)**		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
MW45	0.05	0.10	0.09	52	94	73
MW46	0.05	0.10	0.09	52	94	72
MW47	0.05	0.10	0.09	50	94	72
MW48	0.05	0.10	0.08	52	93	71
MW49	0.05	0.10	0.08	52	93	70
MW52	0.07	0.11	0.10	50	90	70
MW53	0.06	0.11	0.10	50	90	70
MW54	0.05	0.09	0.07	52	94	72

TABLE 5-3

AQUIFER TEST DATA AND THE NoVOCs™WELL SPECIFIC CAPACITY
NoVOCs™HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Type of Test	Test Step	Pumping or Recharge Rate (Q) (gpm)	Measured Maximum Drawdown or Water Level Rise(s) (feet)	Specific Capacity[a] (gpm/foot)	Average Specific Capacity (gpm/ft)
Upper Aquifer zone Step Drawdown Test	1	10	5.89	1.70	1.48
	2	15	11.08	1.35	
	3	20	14.31	1.40	
Upper Aquifer zone Injection Test	1	5	3.45	1.45	1.50
	2	15	9.54	1.57	
	3	22	14.82	1.48	
	4	25	16.56	1.51	
Deep Aquifer zone Step Drawdown Rest	1	40	11.40	3.51	3.22
	2	50	15.35	3.26	
	3	64	20.86	3.07	
	4	30	9.92	3.02	

Notes:

a Specific capacity was calculated by dividing pumping or recharge rate (Q) by maximum drawdown or water level rise (s).

gpm gallons per minute

TABLE 5-4

AQUIFER TEST DATA AND WELL EFFICIENCY
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Type of Test	Pumping or Recharge Rate (Q) (gpm)	Measured Maximum Drawdown or Water Level Rise (s) (feet)	Well Loss Coefficient[a] (C)	Well Loss[a] (CQ^2) (feet)	Well Efficiency[b] (%)	Average Well Efficiency (%)
Upper Aquifer zone Step Drawdown Test	10	5.89	0.0084[c]	0.84	85	82
	15	11.08		1.89	83	
	20	14.31		3.36	77	
Upper Aquifer zone Injection Test	5	3.45	0.0012[d]	0.03	99	97
	15	9.54		0.27	97	
	22	14.82		0.58	96	
	25	16.56		0.75	95	
Deep Aquifer zone Step Drawdown Test	30	9.92	0.0006[e]	0.54	95	91
	40	11.57		0.96	92	
	50	15.35		1.50	90	
	64	20.86		2.46	88	

Notes:

a Defined by Equation 5-18

b Calculated using Equation 5-19, where well efficiency in percent (E_{well}) is defined as follows: $E_{well} = \frac{s - CQ^2}{s} \times 100$

c From best fit equation for data in Figure 5-11
d From best fit equation for data in Figure 5-12
e From best fit equation for data in Figure 5-13
gpm gallons per minute

TABLE 5-5

UPPER AQUIFER ZONE
CONSTANT DISCHARGE PUMPING TEST CONFIGURATION
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

GENERAL INFORMATION	
Pumping well:	NoVOCs™ well (upper screen interval)
Pumping well casing diameter:	8 inches
Pumping rate:	20 gallons per minute
Pumping duration:	32 hours
Initial groundwater level:	17 feet bgs
Aquifer saturation thickness:	88 feet

PUMPING AND OBSERVATION WELL INFORMATION

		Screen Interval	
Well ID[a]	**Distance from the Pumping Well (feet)**	**Depth (feet bgs)**	**Elevation (feet relative to MLLW)**
IW-01 (NoVOCs™ well)	0	43 to 47 and 72 to 78	-21.3 to -25.3 and -50.3 to -56.3
MW-45	29.8	42 to 47	-20.0 to -25.0
MW-46	27.7	57 to 62	-35.4 to -40.4
MW-47	31.1	72 to 78	-49.9 to -55.9
MW-48	61.9	52 to 57	-28.6 to -33.6
MW-49	61.7	67 to 72	-43.6 to -48.6
MW-52	93.0	41 to 46	-19.1 to -24.1
MW-53	93.1	72 to 77	-50.4 to -55.4
MW-54	107.9	38 to 78	-18.0 to -58.0

Notes:

a Observation wells MW-50 and MW-51 are not included because no data are available due to datalogger malfunction

bgs Below ground surface

MLLW Mean lower low water level

TABLE 5-6

CONSTANT DISCHARGE PUMPING TEST INFORMATION
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Well ID	Well Function	Distance from Pumping Well (feet)	Initial Response Time (minute)	Maximum Drawdown at the End of the Test[a] (feet)	Screen Interval	
					Depth (feet bgs)	Elevation (feet relative to MLLW)
NoVOCs™ Well (upper screen)	Pumping	0	0	16.02	43 to 47	-21.3 to -25.3
MW-45	Observation	29.8	0.51	0.63	42 to 47	-20.0 to -25.0
MW-46	Observation	27.7	0.53	0.46	57 to 62	-35.4 to -40.4
MW-47	Observation	31.1	0.66	0.40	72 to 78	-49.9 to -55.9
MW-48	Observation	61.9	0.75	0.23	52 to 57	-28.6 to -33.6
MW-49	Observation	61.7	0.75	0.18	67 to 72	-43.6 to -48.6
MW-52	Observation	93.0	0.80	0.22	41 to 46	-19.1 to -24.1
MW-53	Observation	93.1	0.90	0.20	72 to 77	-50.4 to -55.4
MW-54	Observation	107.9	1.30	0.26	38 to 78	-18.0 to -58.0

Notes:

a Observation well drawdown data have been tidally corrected
bgs Below ground surface
MLLW Mean lower low water level

TABLE 5-7

AQUIFER HYDRAULIC PARAMETERS
UPPER AQUIFER CONSTANT DISCHARGE PUMPING TEST
NOVOCS™ HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Observation Well	Transmissivity (T) ($feet^2$/day)	Hydraulic Conductivity (K)		Storativity (S) (dimensionless)	Specific Yield (S_y) (dimensionless)	Neuman Delayed Yield factor (**b**) (dimensionless)	Ratio of Vertical to Horizontal K (K_Z/K_r) (dimensionless)
		(feet/day)	(cm/sec)				
MW-45	2,450	28	0.010	0.0084	0.12	0.03	0.26
MW-46	2,722	31	0.011	0.0073	0.05	0.03	0.30
MW-47	2,441	28	0.010	0.0019	0.06	0.03	0.24
MW-48	2,553	29	0.010	0.0045	0.09	0.09	0.18
MW-49	2,774	32	0.011	0.0022	0.11	0.08	0.16
MW-52	2,550	29	0.010	0.0038	0.10	0.09	0.08
MW-53	2,199	25	0.009	0.0014	0.05	0.10	0.09
MW-54	2,515	29	0.010	0.0021	0.02	0.12	0.08
Average	2,526	29	0.010	0.0040	0.07	0.07	0.17
DFT	2,771	33	0.0115	0.001~0.01	N/A	N/A	0.20

TABLE 5-8

MEAN GROUNDWATER AND EQUIVALENT FRESH-WATER HEADS
NoVOCs™ HYDROGEOLOGICAL INVESTIGATION
NAS NORTH ISLAND

Aquifer Zone	Well ID	Mean Groundwater Elevation after Tidal Correction (feet MLLW)	Parameters Used in Calculating Equivalent Fresh- Water Heads				Equivalent Fresh - Water Heads[c] (feet MLLW)
			TDS Concentration (mg/L)	Groundwater Density[a] (kg/m^3)	Groundwater Specific Gravity (unitless)	Well Screen Elevation[b] (feet MLLW)	
Upper Zone	MW45	4.78	17,600	1,011	1.011	-22.51	5.07
	MW48	4.56	25,700	1,016	1.016	-31.08	5.13
	MW52	4.64	22,700	1,014	1.014	-21.55	5.01
	PW	4.97	21,300	1,013	1.013	-23.77	5.35
Lower Zone	MW47	4.33	32,000	1,020	1.020	-52.35	5.49
	MW49	4.40	29,200	1,019	1.019	-46.08	5.33
	MW53	4.34	31,000	1,020	1.020	-52.91	5.47

Notes:

A Density is calculated based on Equation 5-31
B Well screen elevation is determined as the middle point of the well screen
C Equivalent fresh- water head is calculated based on Equation 5-30

6.0 CONCLUSIONS

The hydrogeological investigation of the aquifer treated by the NoVOCs™ system has yielded valuable information regarding the hydraulic characteristics of the aquifer, pumping and injection capacities of the NoVOCs™ well, and defects in the NoVOCs™ well. The conclusions of the investigation are as follows:

- The tested aquifer is significantly influenced by tidal fluctuations in San Diego Bay, as demonstrated by the drawdown data collected from the observation wells during the constant discharge pumping test of the NoVOCs™ well.

- The tidal effects on groundwater levels must be corrected to allow the calculation of aquifer parameters and the mean groundwater elevations.

- Groundwater levels must be corrected for density effect for determination of groundwater flow patterns. The mean equivalent fresh water head contour maps show that groundwater at the vicinity of the NoVOCs™ well flows to the west or northwest in both of the upper and lower aquifer zones. The horizontal hydraulic gradient of the two aquifer zones ranges from 0.005 to 0.01.

- Two methods were developed for tidal correction of groundwater drawdown data obtained during the constant discharge pumping test. The methods involve using the tidal influence study data collected in April 1998 to calculate the tidal efficiency and time lag for each of the observation wells. The estimated tidal efficiency ranges from 0.05 to 0.1 in different tidal cycles at different wells; the estimated time lags range from 46 to 96 minutes.

- Observed drawdown data collected during the constant discharge pumping test were corrected using the two new tidal correction methods. The corrected drawdown (that is, drawdown data with the tidal effects removed) using both methods correlates well with each other and reflects typical pumping test responses. The corrected drawdown matches reasonably well with Neuman type curves for the aquifer parameter estimation.

- The aquifer hydraulic parameters were estimated based on the tidally corrected groundwater drawdown data for the constant discharge pumping test. The average hydraulic conductivity was estimated as 29ft/day or 0.01 cm/sec. The average aquifer storativity and specific yield are 0.004 and 0.07. The average ratio of horizontal to vertical hydraulic conductivity is estimated at 5.7.

- Specific capacity and efficiency of the NoVOCs™ well were estimated based on the step-drawdown tests and water injection test conducted at the NoVOCs™ well. The calculated average specific capacities are 1.48 gpm/ft for the upper screened pumping, 1.50 gpm/ft for the upper screened injection, and 3.22 gpm/ft for the lower screened pumping. The calculated average well efficiencies are 82 percent for the upper screened pumping, 97 percent for the upper screened injection, and 91 percent for the lower screened pumping. The 97-percent well efficiency for the upper screened injection is for injection of clean tap water.

- The radius of influence during the constant discharge pumping test (20 gpm) was at least 100 feet based on drawdown measured at the observation wells. No data were collected from the observation well farthest from the pumping well (MW-54), which is 105 feet from the NoVOCs™ well.

- No positive (recharge) or negative (flow barrier) boundaries are evident from the constant discharge pumping test data.

- The injection test results show that the maximum flow of clean tap water that can be injected through the upper screen of the NoVOCs™ well is 25 gpm. At that injection rate, the water level will rise 17 feet and reach the ground surface.

- The video survey of the NoVOCs™ well revealed a manufacturing defect in the upper well screen. The screen slots are unevenly cut, and about 30 percent of the slots do not completely penetrate the PVC casing. This defect affects the well efficiency of the upper screened interval and may reduce the available water level rise in the NoVOCs™ well during recharge to the aquifer through the upper screen.

- The video survey also revealed significant fouling of the NoVOCs™ well screens by iron precipitation and microbiological growth. Such fouling may impair the performance of the NoVOCs™ system by obstructing the well screen and filter pack.

- The findings of the aquifer tests and tidal study of the aquifer treated by the NoVOCs™ system indicate that the aquifer hydraulic conditions are suitable for application of the NoVOCs™ technology. The NoVOCs™ well as designed should be able to extract and inject a flow rate of 20 gpm based on the aquifer hydraulic characteristics.

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